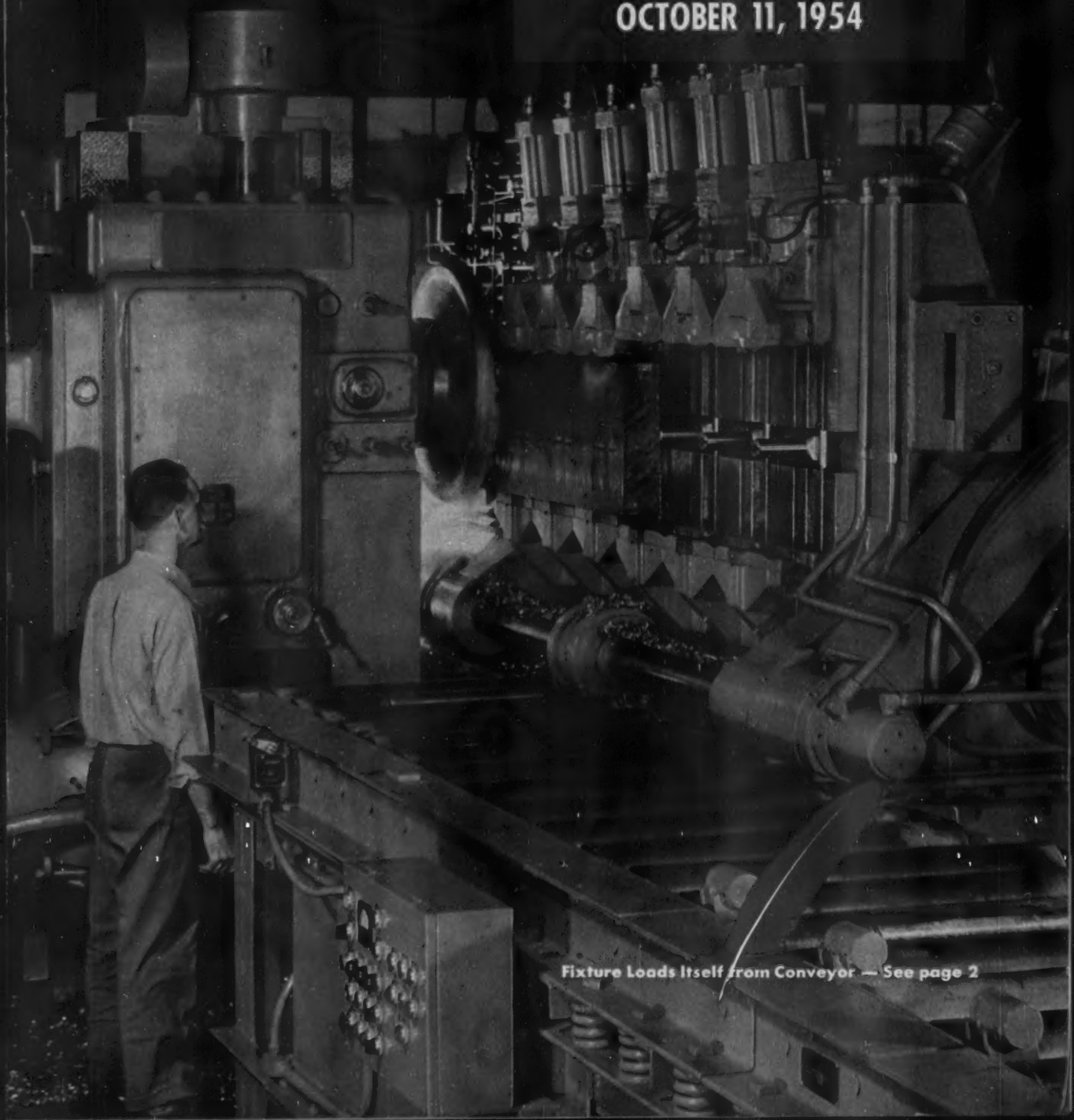
PRICE 50 CENTS

Workholding Devices
... A SPECIAL REPORT
Dial Feeds
Repetitive Cutting Accuracy

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION

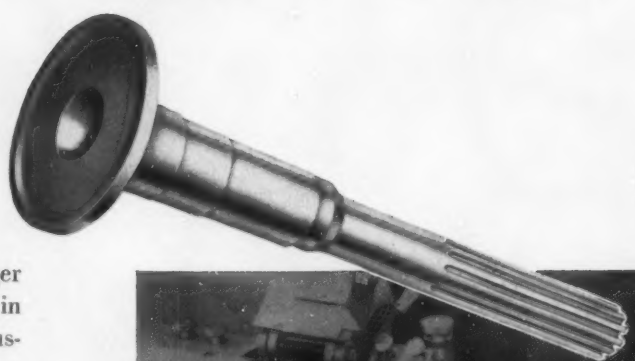
OCTOBER 11, 1954



Fixture Loads Itself from Conveyor — See page 2

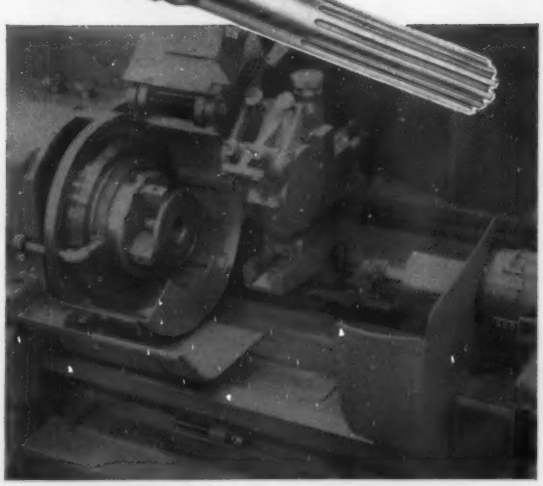
5½ BILLION HORSEPOWER ON THE GO!

. . . your share is a little more dependable, more responsive, because of Heald precision-finished parts like this



Yours is among the more than 45 million passenger cars representing some 5½ billion horsepower in use today—a real tribute to the automotive industry and the precision mass production that has made it possible. There are many Heald machines in this production picture, precision finishing hundreds of different parts. The one shown here is a typical example.

Applied to any job, Heald precision means time and money saved—a finer, longer-lasting product that can stay ahead in the competitive race. That's why IT PAYS TO COME TO HEALD.



The model 271 Size-Matic Internal above precision grinds two different I.D.'s simultaneously in automatic transmission output shafts. Wheelhead spindle carries two wheels of different diameters. Air-operated diaphragm chuck simplifies loading. Entire operating cycle—rough grind, dress, finish grind, size and retract—is fully automatic. Constant feed throttling maintains consistent feed rates regardless of internal or external temperature changes.

THE HEALD MACHINE COMPANY

WORCESTER 6, MASSACHUSETTS

Chicago • Cleveland • Dayton • Detroit • Indianapolis • New York

American Machinist

MAGAZINE OF METALWORKING PRODUCTION

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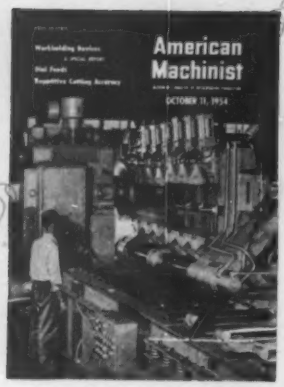


chips

8 TO 1 INCREASE . . . American Brass Co has recently installed at its Ansonia, Conn, plant a standard Sundstrand Model 66, 100-hp, Rigidmil with 30-in.-dia cutter for milling both sides of copper-base alloy cakes. Production increases up to eight times have been achieved. Parts up to 72 in. long are cycled through under pushbutton control, the leaf-type fixture actually picking pieces up off the conveyor.

THE FEATHER . . . You will note on our cover the now-familiar red feather, symbolizing the current Community Chest campaigns. Because we believe in one drive for charity and welfare, not many, we carry it as a reminder.

WORKHOLDING . . . At long last, we publish the second instalment of our 2-part Special Report on workholding devices, this one dealing with stationary types used on machine tools. The first section was published almost a year ago—Oct 26, '53—dealt with rotary workholders, and was very well received. Reprints are still available, as they will be of this one.

BORE GAGING . . . Dodge air-gages eight bores in succession with four heads by using a reversing fixture. Blocks are transferred from overhead to roller conveyors in the process.

CONTACTS . . . Frank Piekos of Springfield Armory (see biog) provides an answer to the problem of making sure parts are seated in fixtures. The answer is electrical contact buttons, all of which must be activated or the job doesn't run. That checks operator carelessness. Included are wiring diagrams and details.

DIAL FEEDS . . . Stamping costs can be cut by combining good tooling with dial feeds. Our lead article, by Wm W Schug of V & O Press, shows how operators, presses, floorspace and time can be cut. Dial feeds also serve as inspectors—or force proper pre-inspection. There's much meat in these five pages.

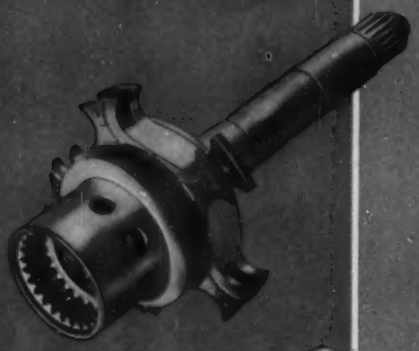
FORMING TI . . . Engine mountings have been a principal application for titanium, and Rohr Aircraft makes a lot of them. Here is an exclusive account of how forming dies are heated by liquid media, electric cartridge or resistance—and how to make them work. . . . There's also a single page showing a shear die that cuts wide stock to 45° miters semi-automatically.

EXCESS REJECTS . . . If something goes wrong with parts at Warner & Swasey, a special system automatically calls the attention of foremen, operators, and process men to the problem.

COMING . . . Oct 25 *AM* will be our Metal Show Issue. In addition to descriptions of new items to be shown in Chicago, there'll be a Special Report on numerical control (tape, film, wire or cards) for machines plus articles on induction heat-treating of gears, on forming a sports-car tailpipe, on C-frame presses, on job-lot shell molding, and on several other subjects. Don't miss it.

MILLER . . . Frank E Piekos, born in Springfield, Mass, in 1910, went to the technical high school there, then to Moore Drop Forging for nine years as a toolroom machinist. He moved to Springfield Armory in 1935 and has been in the Milling Division ever since. As divisional foreman in World War II, he received the emblem award for meritorious civilian service for his work in developing new and simplified manufacturing methods. His description of use of contact buttons to assure repetitive accuracy with fixtures is in this issue.

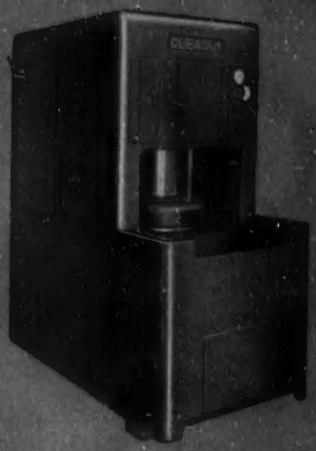
Pinion carrier for an aircraft planetary reduction gear.



Impeller shaft for aircraft supercharger.

Aircraft cam gear.

Breech block for an automatic rifle.



The Gleason No. 26 Quenching Press for parts up to 25" in the maximum dimensions.

The Gleason No. 140 Quench Machine for shafts and similar parts 5/16" to 4" in diameter, up to 43" in length.

How to hold parts like these to close tolerances during quenching

Are you troubled by warpage or distortion of precision parts during hardening?

If you have this problem, Gleason Quenching Equipment can help solve it with substantial savings in costs.

This equipment provides automatic, controlled quenching of flat, round, irregular, or shafted parts insuring alignment and minimizing distortion.

For round, flat or irregular parts up to 36" in the maximum dimension there are three sizes of Gleason Quenching Presses of the type shown at the top right.

For shafts or similar parts there is the Gleason Rolling Quench Machine, shown at lower right. It accommodates shafts from $\frac{5}{16}$" to 4" in diameter, from 6" to 43" in length, and can handle parts with integral cams, gears or shoulders up to 8" in diameter.

In all these machines the heated part is held under pressure. Flow of the quenching fluid to each portion of the heated part is accurately controlled at preset rates during all stages of the quenching cycle.

In the Quenching Presses precision dies hold the part in alignment and direct the flow of quenching medium during the quenching cycle. In the Rolling Quench Machine the part is rolled under controlled pressure. Relative pressures applied to the various portions of the part are accurately and automatically controlled.

The use of Gleason Quenching Equipment eliminates the need for any subsequent straightening. This is important for two reasons: (1) It saves one operation, reducing production costs. (2) Hardened parts which do not require straightening have less residual stress. Further information will gladly be sent on request.

GLEASON WORKS

Builders of bevel gear machinery for over 85 years

1000 UNIVERSITY AVE., ROCHESTER 3, N.Y.

See these machines in Booth 454

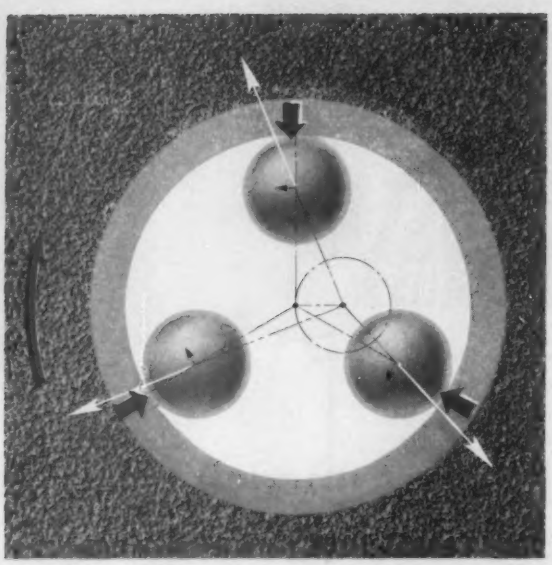
AT THE NATIONAL METAL EXPOSITION

Chicago November 1-5, 1954

40

AUTOMATIC GRINDING WHEEL

Now standard on Cincinnati



Here's how it works. Three steel balls are carried in a raceway in the wheel end of the spindle. As the spindle rotates, the balls are free to move and correct any unbalanced condition that may exist. Then they are clamped in position.

This exclusive Cincinnati feature automatically balances the grinding wheel in a few seconds with the spindle rotating at its operating speed.

Eliminates vibration and resultant chatter . . . permits more effective stock removal; produces superior finish; reduces wheel cost per workpiece.

Automatic balancing of grinding wheels climaxes years of Cincinnati research in adapting a fundamental principle of balancing to the needs of precision grinding machines. ¶ Under ordinary shop conditions, using conventional static balancing equipment, even skilled operators will seldom balance the grinding wheels so that a precision balance is obtained. At normal operating speeds the slightest degree of unbalance produces an uneven cutting action. Although not always visible to the eye, this results in a variation of sparking. Cincinnati automatic balancing system is ten times as accurate as conventional static balancing. ¶ Together with trouble-free FILMATIC spindle bearings, automatic balancing of grinding wheels assures smooth, even cutting to closer dimensional accuracy, superior finishes and higher production at a lower cost. ¶ Complete information may be obtained by writing for publication No. G-637-1.

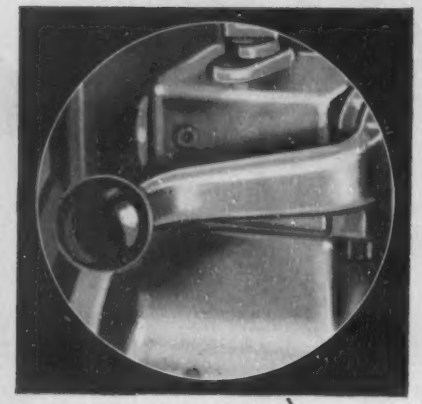
CINCI NATI

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

CINCINNATI

BALANCING equipment Filmatic

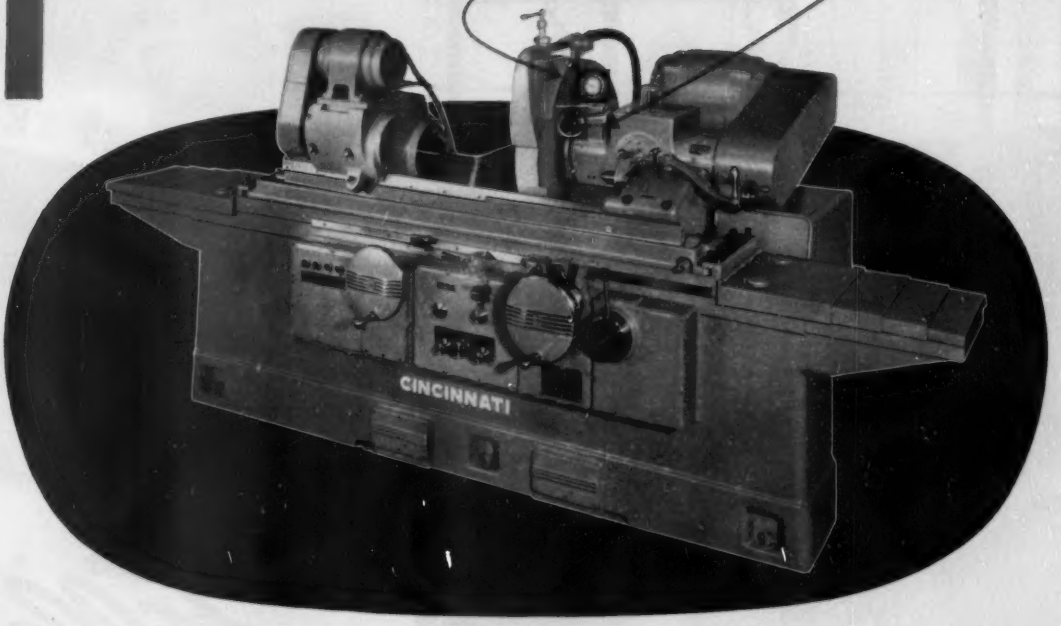
6", 10" L, 10" and 14" L PLAIN HYDRAULIC GRINDERS



This lever clamps and unclamps the balls in their raceway. Anyone can perfectly balance the grinding wheel . . . in a few seconds' time.

FILMATIC

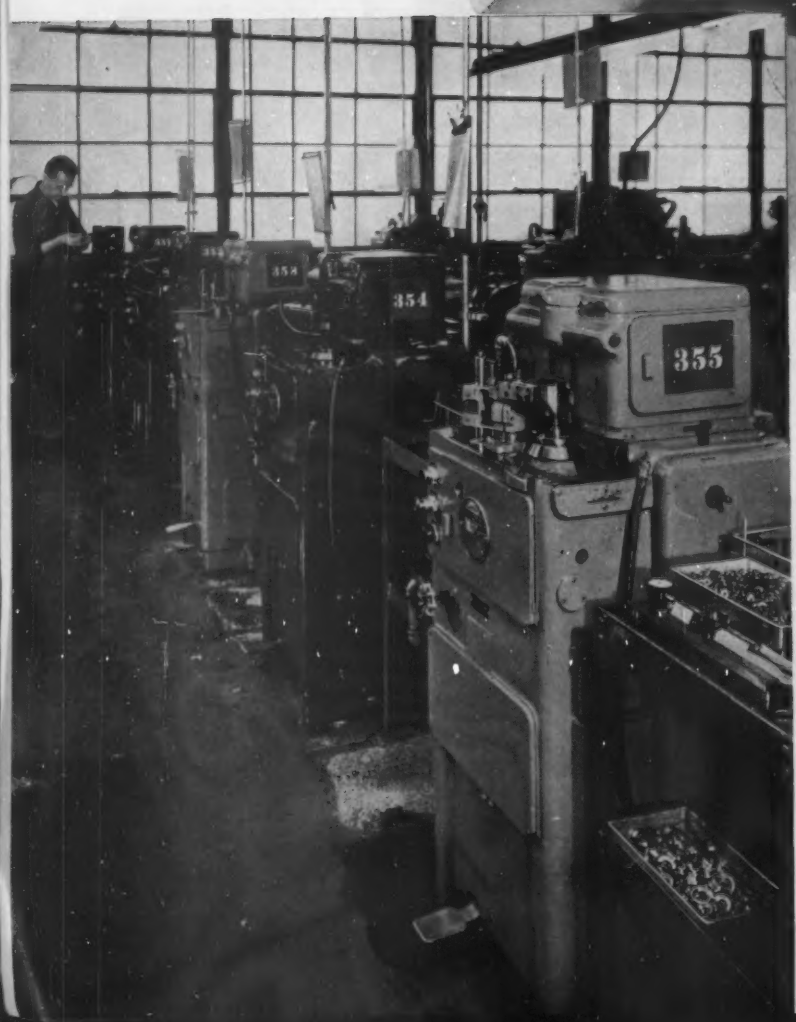
An indicator needle tells the operator when the system is balanced.



CINCINNATI FILMATIC 10" x 36" Plain Hydraulic Grinding Machine.

CENTERTYPE GRINDING MACHINES • CENTERLESS GRINDING MACHINES
CENTERLESS LAPPING MACHINES • MICRO-CENTRIC GRINDING MACHINES

REVERE STEREO



27 TEETH . . .

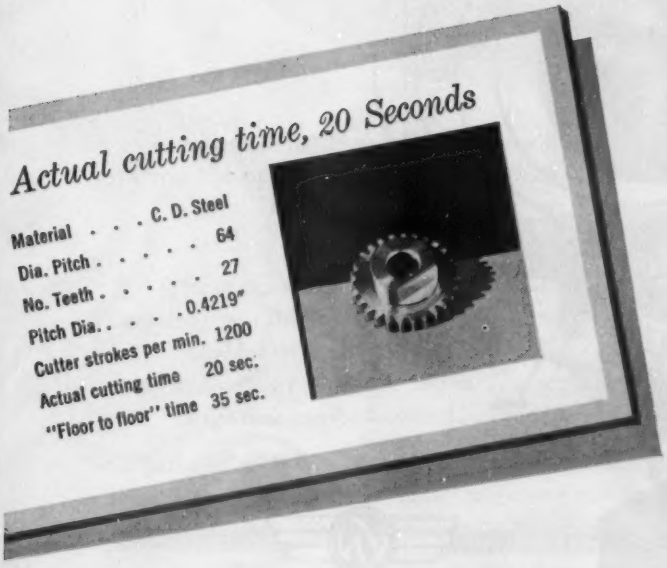
THE *Fellows*

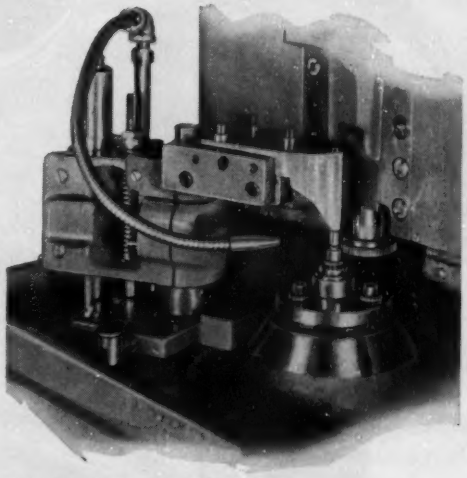
demands high-speed gear cutting

PRODUCTION schedules at Revere Camera's big Chicago plant are under pressure. 3-D slides and the REVERE STEREO camera are currently in exceptional demand.

So much so that over 30% of the output of their battery of Fellows Fine-Pitch Gear Shapers is at present concentrated on stereo camera parts. Various film feed, focus and shutter parts are turned out. One, in slightly magnified scale, is pictured and detailed below. Cutting is a typical Fellows high-speed operation.

Revere rightly expects top quality performance from its Gear Shapers—and gets it. So will any precision shop which pins its faith to the Fellows Method. Capacities of the several types of Gear Shapers range from 1/16 inch to 120 inches. A Fellows Sales Engineer can give you cost and performance data on the type best suited to your job. Write, wire or phone the nearest office.


Actual cutting time, 20 Seconds
Material . . . C. D. Steel
Dia. Pitch 64
No. Teeth 27
Pitch Dia. . . . . 0.4219"
Cutter strokes per min. 1200
Actual cutting time 20 sec.
"Floor to floor" time 35 sec.



Fellows 3" Fine-Pitch Gear Shaper cutting stop gear for Revere Model 33 Stereo in 35 seconds 'floor to floor'.

GEAR SHAPER COMPANY

Head Office and Export Department, Springfield, Vermont.
Branch Offices: 319 Fisher Building, Detroit 2, Michigan • 5835 West North Avenue, Chicago 39, Illinois • 2206 Empire State Building, New York 1, N. Y.

...ONLY the New

VAN NORMAN Ram Type Millers

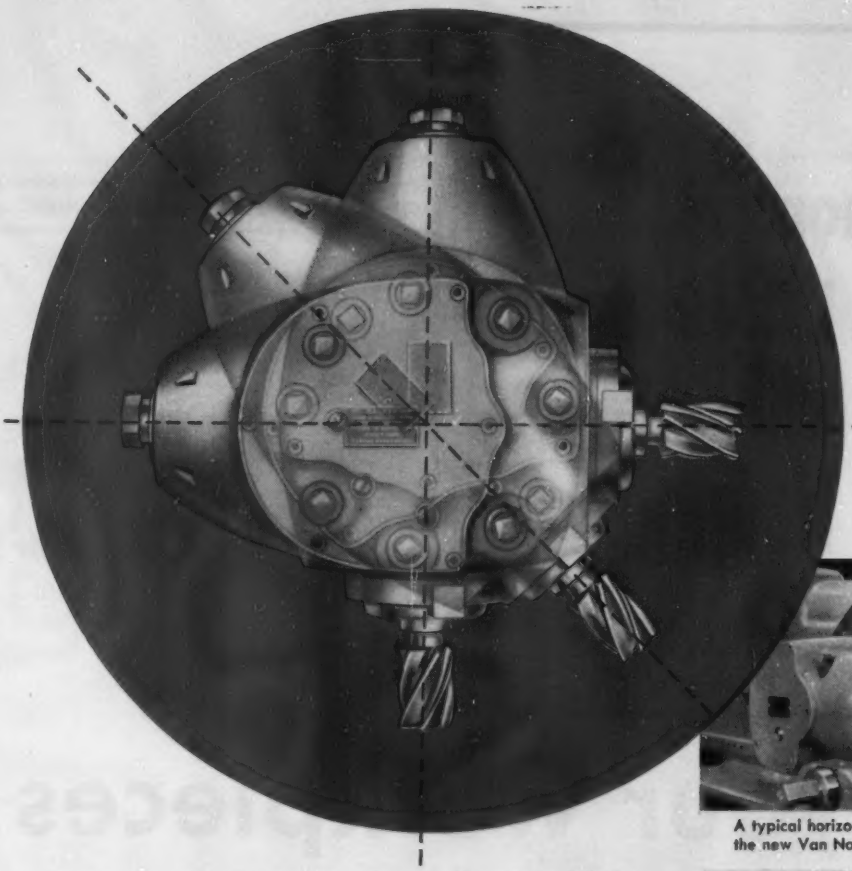
give you the exclusive advantages of the

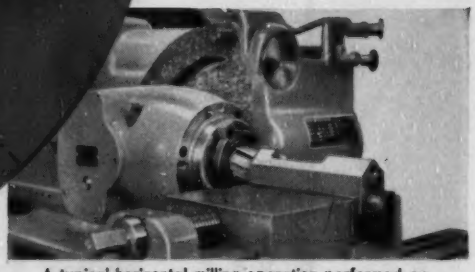
ADJUSTABLE CUTTERHEAD

No. 24-L . . . One of the 10 new Van Norman Ram Type Millers. Table Size: 45" x 10½". Ram Travel: 29". Cutterhead Motor: 3 HP. Feeds: 5" to 36" IPM. Speeds: 50 to 1400 RPM.

VAN NORMAN

Manufactures Ram and Column Type Milling Machines . . . Cylindrical Grinders . . . Centerless Grinders . . . Spline and Gear Grinders . . . Oscillating Radius Grinders . . . Special Production Grinders





A typical horizontal milling operation performed on the new Van Norman Ram Type Miller.

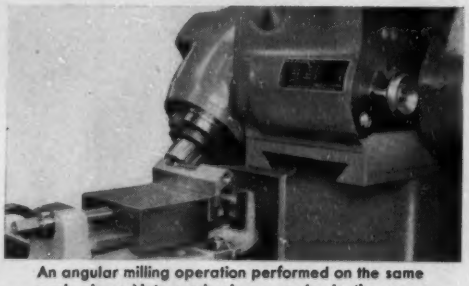
Every one of the *10 new* Van Norman Ram Type Millers give you the operating advantages of extra "*Flex-Ability*" and "*Cut-Ability*" that cut toolroom and production milling costs.

The exclusive adjustable cutterhead, mounted on the heavy-duty movable ram, provides maximum "*Flex-Ability*" . . . enables you to perform horizontal, angular and vertical milling with *one* miller . . . increase the work range that can be handled . . . reduce tooling costs.

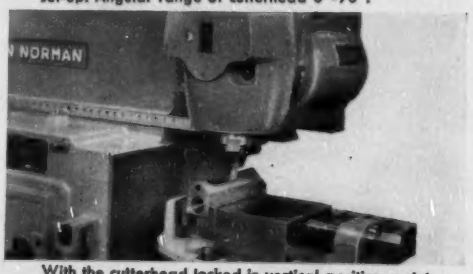
Extra "*Cut-Ability*" is assured through the new heavier columns and bases, larger knee, table and saddle assemblies, extra-heavy gears and spindle motors up to 10 HP.

Production, toolroom, laboratory or job shop . . . you simply can't beat these Van Norman Ram Type Millers for simplified set-ups, tooling and maximum output.

Write, wire or phone for complete details



An angular milling operation performed on the same work piece. Note work piece remains in the same set-up. Angular range of cutterhead 0°-90°.



With the cutterhead locked in vertical position a slot is milled in the work piece. Note the set-up has not been changed.

COMPANY | **SPRINGFIELD 7, MASSACHUSETTS**

A Demonstration of the LANDIS Thread Rolling Machine on your workpieces

THE WORLD'S LARGEST

The new LAN-HY-ROL Thread Rolling Machine offers a combination of precision, productivity, and flexibility in generating external threads unequalled by any other machine now available in the Western Hemisphere. Yet we believe that its superiority is so great that its unlimited potentialities cannot be understood without seeing actual operation.

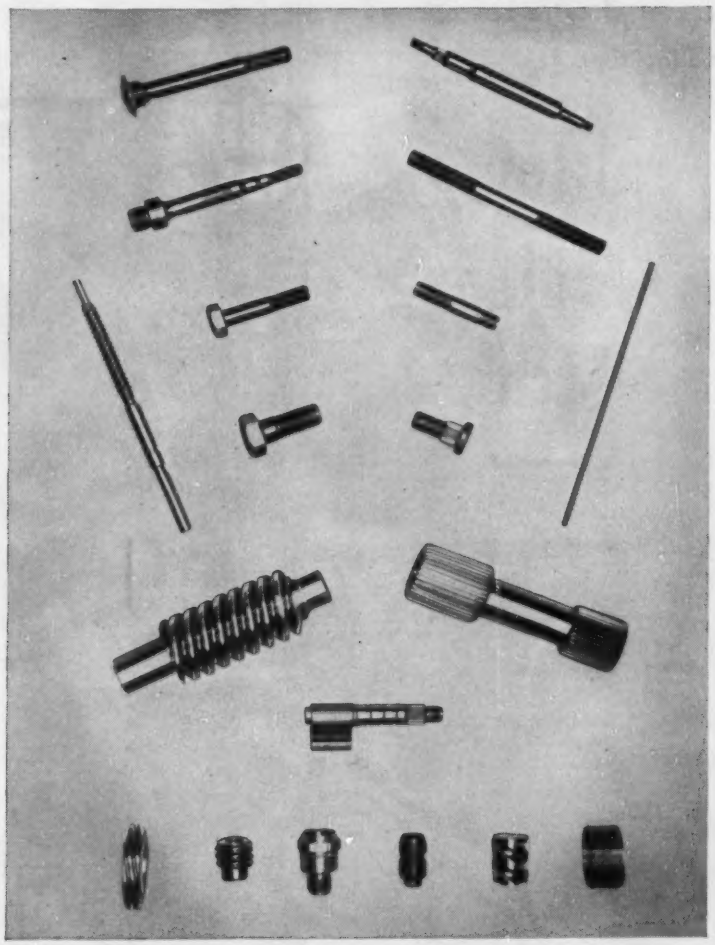
Therefore, we are offering all manufacturers an operating demonstration of the new LAN-HY-ROL, using your own workpieces if you prefer. Send us the necessary thread specifications and prepared workblanks—we will make the dies required at our own expense, then arrange an operating demonstration here in Waynesboro at your convenience.

The new LAN-HY-ROL is based on a rolling system using two circular thread rolling dies and a work support blade. It will produce UNC and UNF threads to tolerances up to and including Class 4, and will also roll Acme, worm, and other special threads. The LAN-HY-ROL will roll threads from 3/16″ to 3″ in diameter up to 5-7/8″ long by plunge rolling, and up to 72″ by thrufeed rolling. It can also be equipped for automatic hopper feeding, semi-automatic hand feeding, or rolling special threads between centers.

Plan today to investigate the cost-saving advantages of the new LAN-HY-ROL Thread Rolling Machine. Contact us direct in Waynesboro, or through one of our field representatives, about arranging a demonstration.

408-C

MANUFACTURERS OF THREADING EQUIPMENT—CUTTING—TAPPING—GRINDING—ROLLING

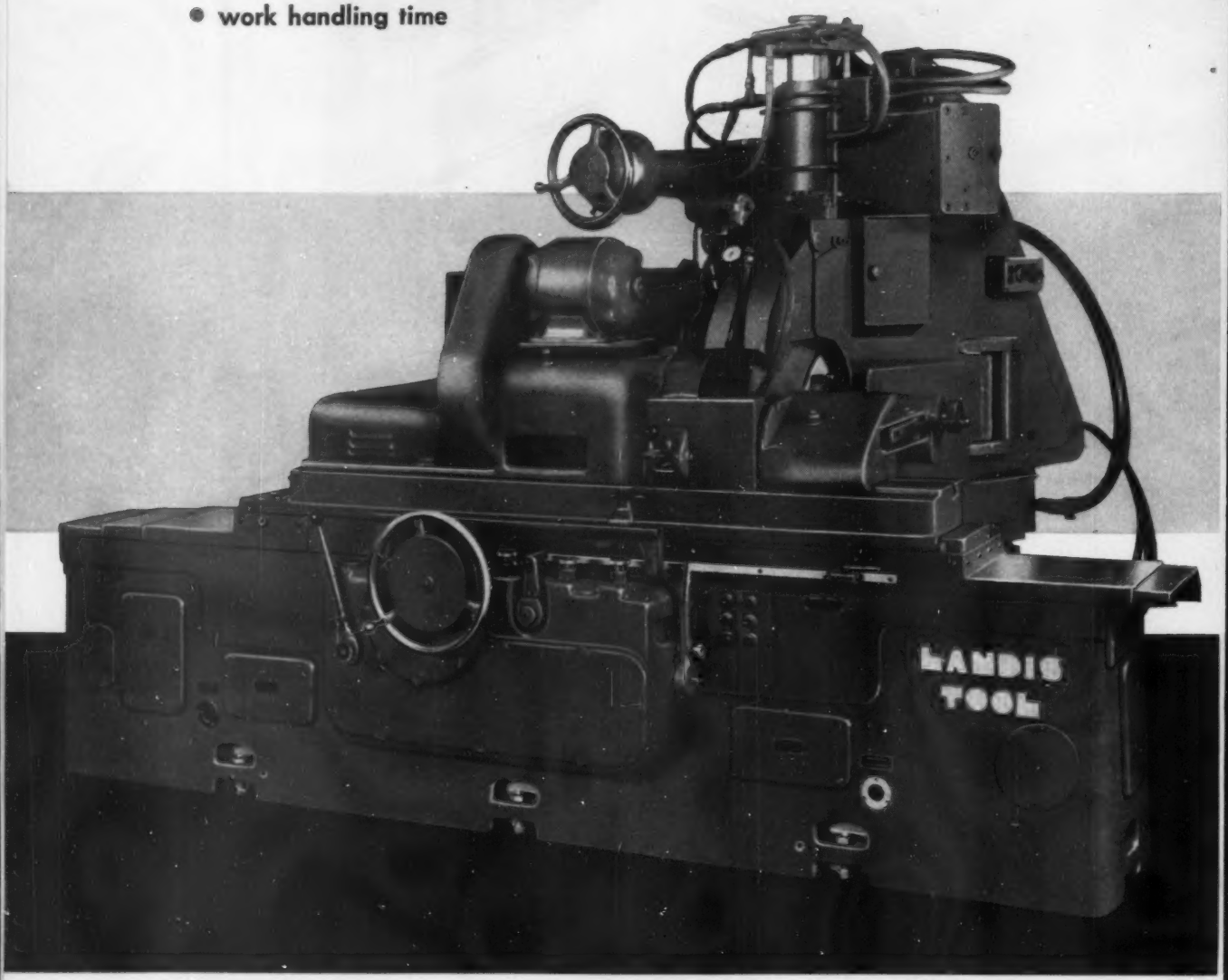


LANDIS *Machine* CO. WAYNESBORO PENNSYLVANIA

How to Cut Grinding Costs

This Landis engineered method saves:

- investment in an additional machine
- production cost of extra operations
- work handling time



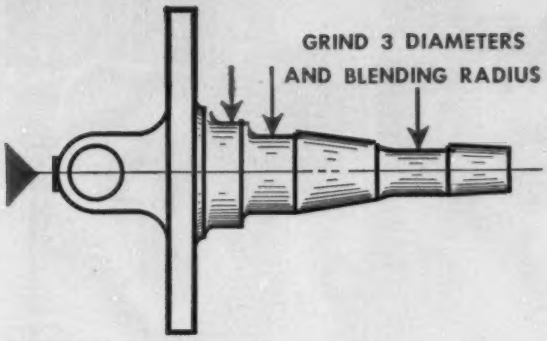
Landis 10" x 36" Type CH Plain Grinder with wheelbase set at 30°.
Overhead, hydraulically operated profile dresser.

LANDIS

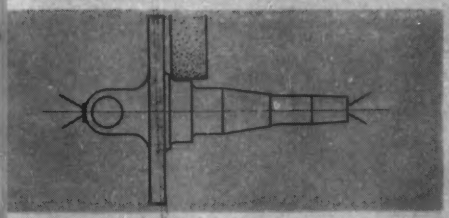
precision grinders

by Combining Operations

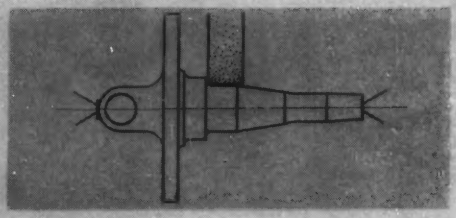
here's an example



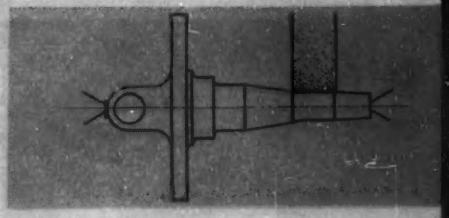
old fashioned method—3 operations



operation No. 1



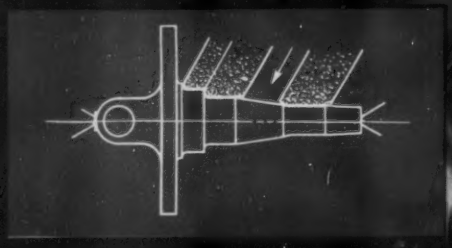
operation No. 2



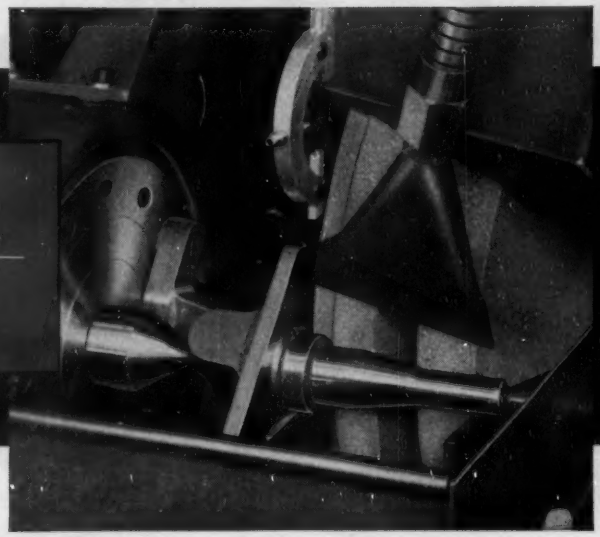
operation No. 3

modern method

Landis angle wheelbase grinding

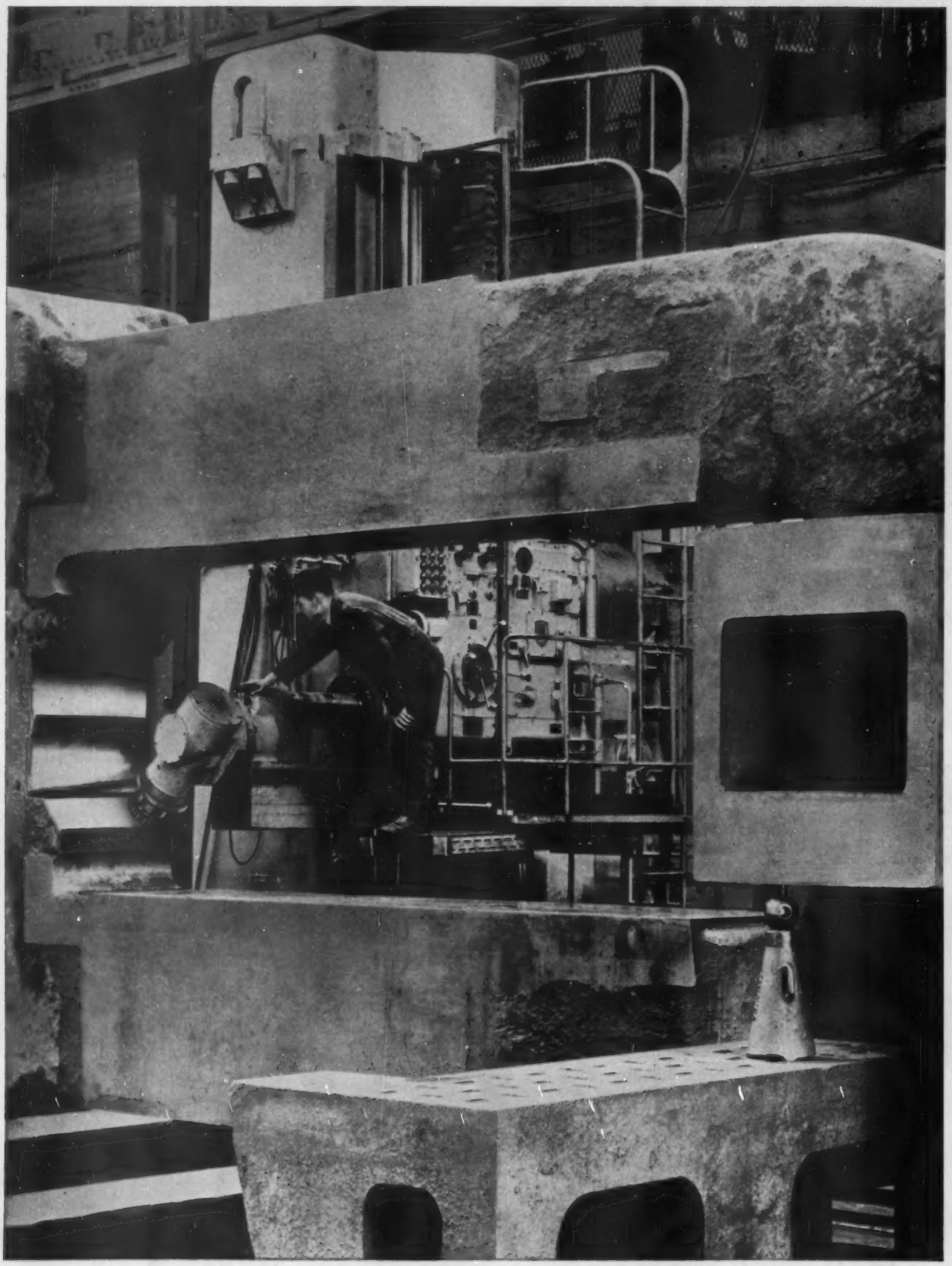


only 1 operation!



Three Diameters and Three Blending Radii of front wheel spindles are ground in one operation. Grinding is performed with spaced wheels on a wheelbase set at 30° angle. Stock removal is .015" on diameter and .009" on faces. Limits are .0005" on diameter and .010" on radius.

LANDIS TOOL COMPANY / WAYNESBORO, PENNA., U. S. A.



This Giddings & Lewis 7-in. spindle floor-type, horizontal boring machine with underarm ram and angular milling attachment completely machines the window of a large rolling mill housing.

KING-SIZE

for bigger profits!

Giddings & Lewis floor-type, high-power, precision horizontal boring, drilling and milling machines are unmatched in accuracy and production capacity

Giant-size, cast-iron and steel castings with many surfaces — requiring any combination of precision milling, boring or drilling — can be bigger profit-makers when you machine them on Giddings & Lewis 50 Series horizontal boring machines.

You'll find it highly profitable to mill, face, turn and bore on these up-to-the-minute designed machines. Optional equipment permits even greater range of applications. Standard arrangements and attachments include—underarm spindle supports, angular or offset milling heads, tracer controlled contouring equipment and continuous feed facing heads.

In addition to bigger profits, you also benefit from higher standards of machining accuracy, more production, greater flexibility and versatility of operation.

For complete information on 50 Series, heavy-duty, horizontal boring, drilling and milling machines — in table, floor or planer types — contact your Giddings & Lewis representative or write for Catalog 50-F and Bulletin N-1 for underarm arrangement.

GIDDINGS & LEWIS MACHINE TOOL CO.
FOND DU LAC, WISCONSIN

Builders of the world's finest heavy-duty machine tools: Horizontal Boring, Drilling and Milling Machines—table, floor and planer types; Hypro Double Housing and Openside Planers; Planer Type Milling Machines; Vertical Boring Mills; and Davis Cutting Tools.

VK HIGH SPEED STEEL

THREAD MEASURING WIRES

...basic tools in a universally accepted method of checking screw threads

VK Set No. 20 HS Thread Measuring Wires, accurate to ±.000025" for 20 common pitch Unified and American screw threads, 6 to 36 threads per inch.

The three-wire method is probably the best known and most widely accepted system of measuring pitch diameter of screw threads. Equipment required includes only a set of VK Thread Measuring Wires of proper diameter and an accurate measuring instrument.

Van Keuren Thread Measuring Wires have been developed over a period of many years of pioneering in the precise measurement field. They are made to National Bureau of Standards specifications, are held within .00002" for roundness, straightness and identity and to within .000025" of exact size.

VK Thread Measuring Wires are made of long-wearing, tough and beautifully finished high speed steel and are either 1⅞" or 2" in length. Every wire is subjected to the closest criteria in today's standards of accuracy.

In addition to set No. 20, shown here, VK furnishes many other standard sets as well as special wires in diameters from .001" to 1.500."

The Van Keuren Catalog and Handbook No. 35 contains 91 pages of technical and engineering information on wire measurement of screw threads. This information, compiled from many years research in the field, is available without charge by addressing: The Van Keuren Co., 173 Waltham St., Watertown, Mass.

VK

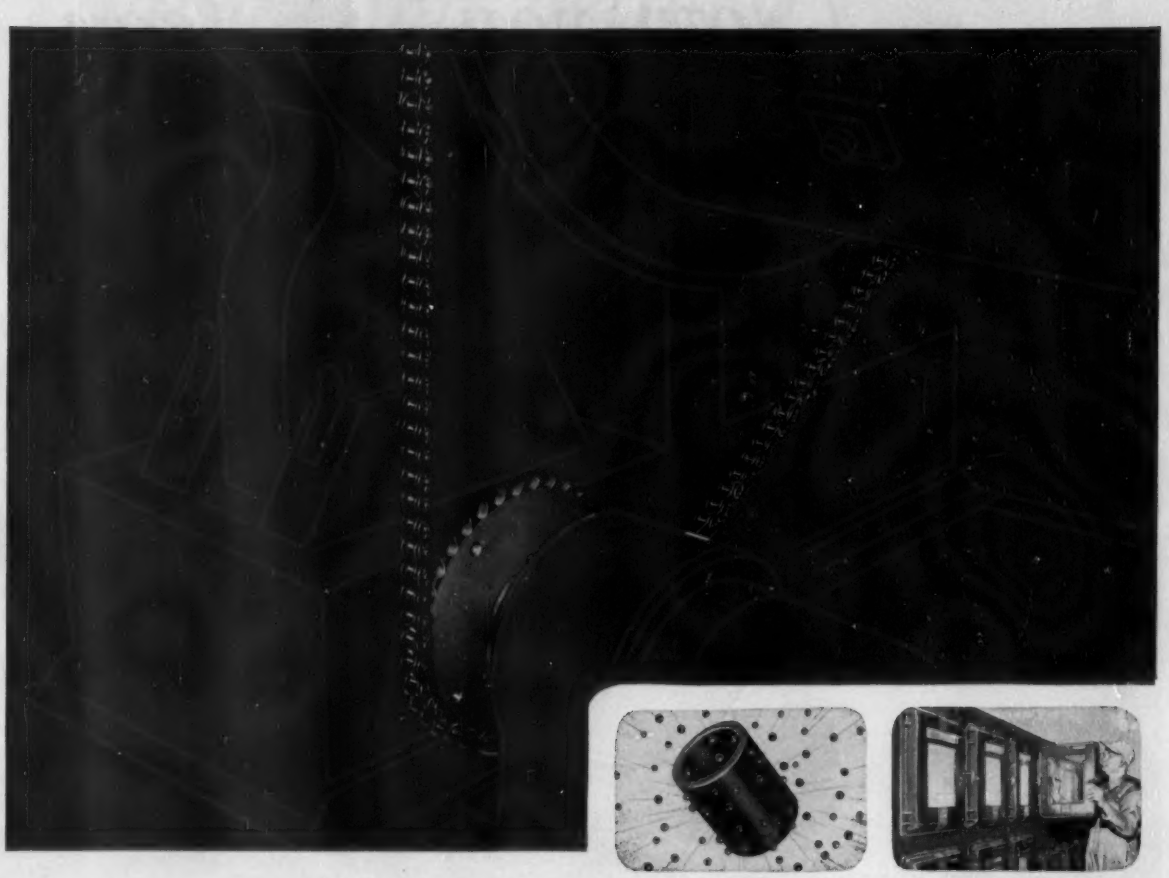
35th YEAR

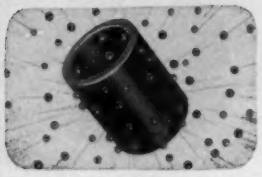
THE Van Keuren CO.,

173 WALTHAM STREET, WATERTOWN, MASS.

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Cemented Carbide Plug Gages • Carboloy Cemented Carbide Measuring Wires • Chrome Carbide Taper Insert Plug Gages

How these EXTRAS* make roller chain last longer





SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

CLOSER HEAT-TREAT CONTROL — coupled with rigid testing insures uniformity.

LOCK-TYPE BUSHINGS (applied on a range of sizes) end a cause of stiff chain.

PRE-STRESSING of multiple width chain provides uniform load distribution.

*And you pay no premium for these LINK-BELT extras

THERE's more to roller chain than just the parts you see. *Much more!* It's the hidden extras—standard on Link-Belt Precision Steel Roller Chain—that add up to longer life and lower costs.

Check the four extras shown here. Then for your demanding drive and conveying jobs, choose from the complete line of Link-Belt roller chains and sprockets: Single or multiple widths, ¼" through 3" pitch. Double pitch, 1" through 3". There's full ordering and application information in 148-page Data Book 2457. Ask your Link-Belt office or distributor for a copy today.

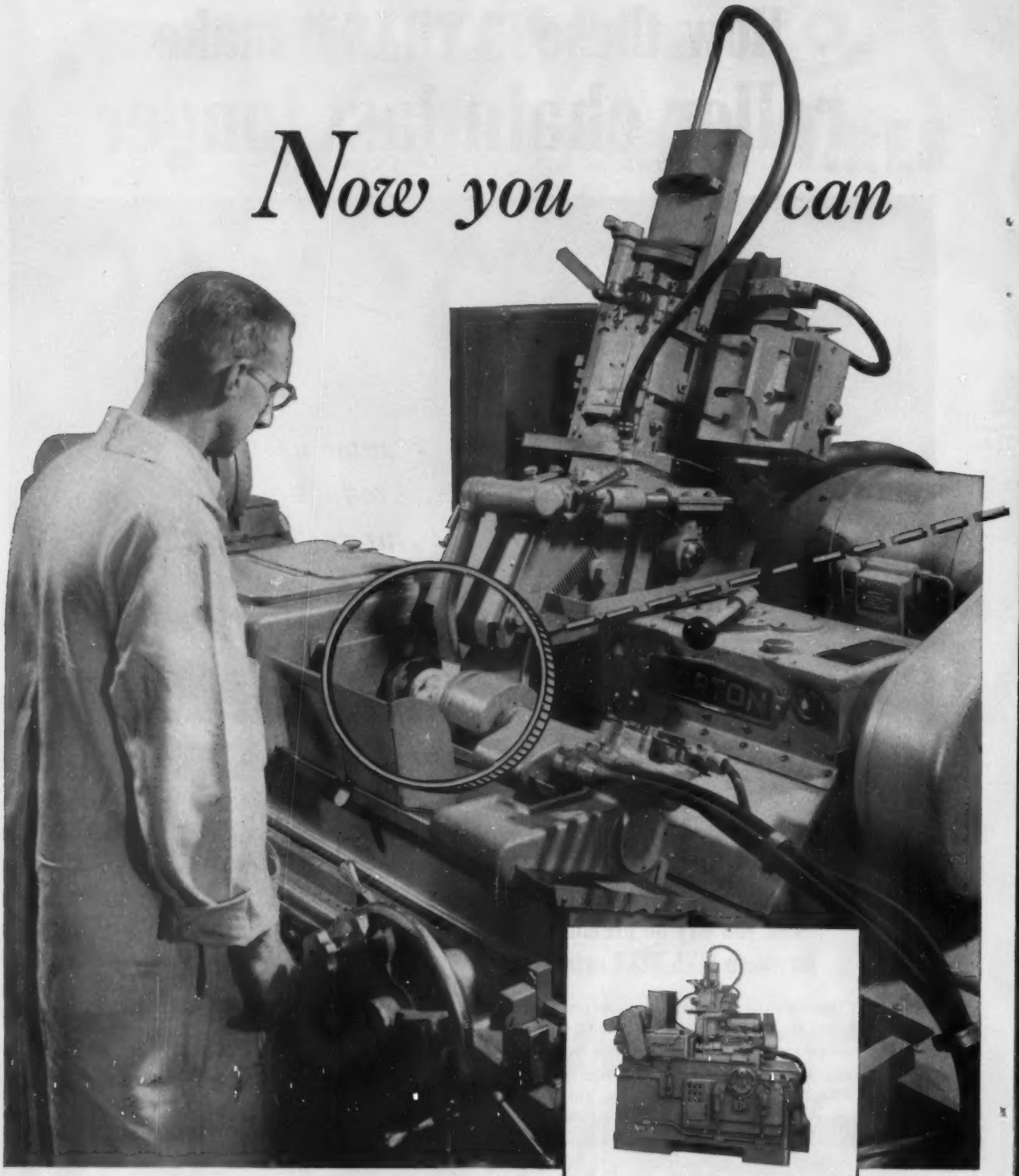
LINK-BELT

ROLLER CHAIN & SPROCKETS

13,000

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

Now you can



Designed For Heavy Duty, High Production Service, the Norton 6″ x 8″ Semiautomatic Piston Grinder produces standard automotive and other types of pistons fast and economically.

Ideal For Automation. Already greatly simplified in operation, and with many automatic features, this advanced grinder is adaptable to complete automation. Particulars on request.

grind pistons better

The Norton 6"x8" Semiautomatic Piston Grinding Machine produces more pistons and lowers your costs

Fast automatic sizing is just one important advantage of the Norton 6″ x 8″ Piston Grinder. This is assured by the repetitive accuracy of the easily adjustable "micrometric-type" revolving screw wheel feed mechanism — *plus* the heavy wheel spindle unit that resists wheel pressures — *plus* the rugged cam generating mechanism that provides enduring accuracy of the motion required for piston skirt form. And this rapid action is built-in for the life of the machine, thanks to massive proportions and generous wear surfaces.

Other High Production Advantages:

- *Simplified Operation* that reduces operator fatigue through convenient location of controls. The operator can make all adjustments for feeds and speeds without leaving his normal position.
- *Automatic Functioning* that operates at a pre-determined pace, hour after hour, minimizing effort and preventing production lag due to operator fatigue.
- *Automatic Grinding Cycle*, operating under electrically timed control and adjustable over a wide range. Starting at the touch of a single lever, the grinding cycle terminates at the pre-set time, ready for removal of the work. (Rotation of the work may be stopped automatically, in the most convenient unloading position, by an optional "electric-eye" arrangement.)
- *Automatic Wheel Truing.* Merely touching a push-button sends the automatic wheel guard type truing device on a round trip across the wheel face at pre-determined speed and feed. This not only lessens the time and skill usually required for truing, but gives closer control of the amount of abrasive removed, thus reducing the wheel cost per piece ground.

Get the Whole Story

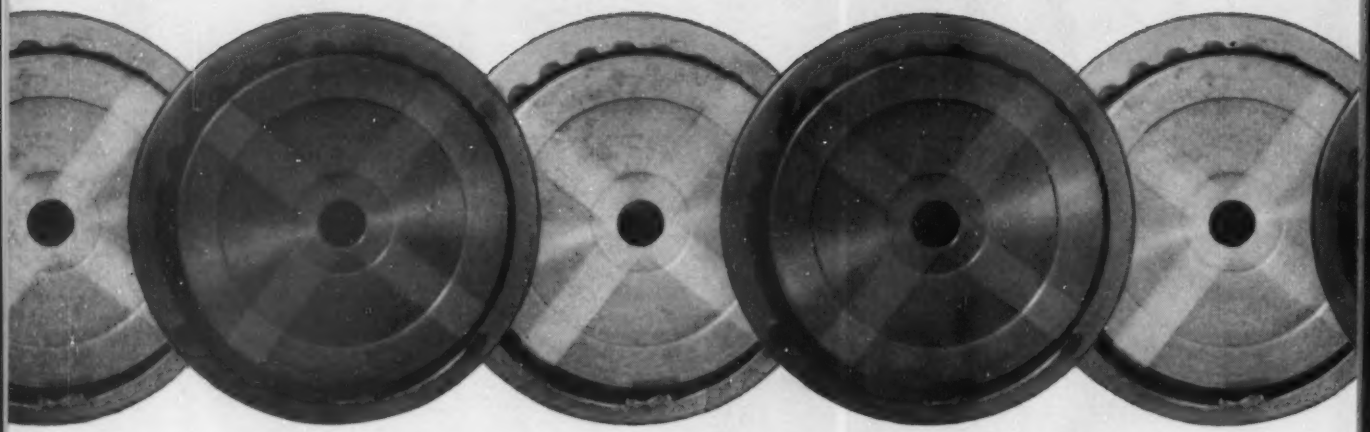
on how the Norton 6″ x 8″ Semiautomatic Piston Grinding Machine can benefit your production. See your Norton Representative, or write direct for Catalog No. 742. And remember: only Norton offers you such long experience in both grinding machines and grinding wheels to help you produce more at lower cost. NORTON COMPANY, Worcester 6, Massachusetts *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

***To Economize, Modernize With* NEW**

NORTON
GRINDERS and LAPPERS

Making better products. . . to make other products better

District Sales Offices: Worcester • Hartford
New York (Teterboro, N. J.) • Cleveland • Chicago • Detroit



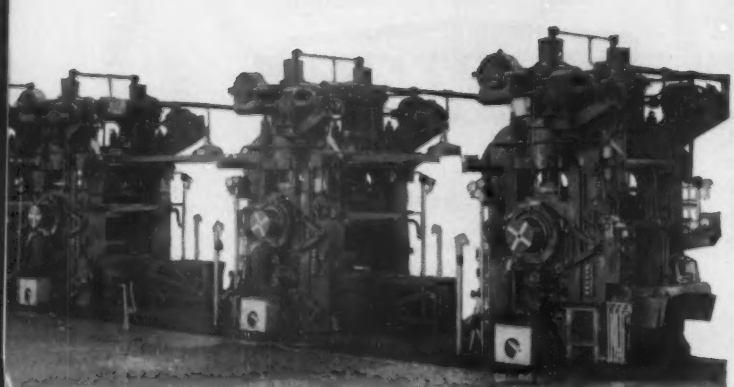
they just keep rolling along!

Oil changed only 3 times in 15 years

■ Here's the kind of a job where a lubricant either has to "put up" or get out.

Above and at right you see closeups of the tremendous bearings in the cold reducing mill of the Greer Steel Company, Anderson, Indiana. These are subjected to shock loads and continual extreme pressures. If there ever was an application where an oil has to prove itself beyond a question of a doubt this is it.

For the past fifteen years, STANOIL Industrial Oil #240 has been proving itself day in, day out by putting up the best lubrication possible on this tough job. *And yet, despite continuous hard operation, this oil has been changed only three times in this entire period!* The big bearings under continual heavy pressure have been successfully protected by STANOIL and have remained as good as new. Lubricant consumption has stayed low . . . with no evidence of *any* sludge or varnish formation. Periodic checks by the Standard Oil Lubrication specialist insure the continued like-new quality of the oil. That means that these vital mills will keep rolling along free from *any* lubrication difficulties.



Standard Oil lubrication specialist Don Wilson puts his training and experience to work to help Greer maintain economical, trouble-free operation. For help with *your* lubrication program call your nearest Standard office or write to Standard Oil, Chicago.

STANOIL

TRADE MARK

Industrial Oil

STANOIL Industrial Oils are versatile, multi-purpose oils designed to do a variety of jobs in a wide range of equipment. STANOIL can simplify stock, storage, and inventory in your plant by replacing many special-purpose oils you may now be using on air compressors, reduction gears, electric motors, auxiliary turbines and other equipment. For sure protection and better operating economy check today on the superiority of STANOIL.

STANDARD

STANDARD OIL COMPANY

(Indiana)

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS WITH WARNER &

When Precision was the Pay-Off!

HALEY MACHINE COMPANY, Springfield, Ohio, recently installed a Warner & Swasey 1 AC Single Spindle Automatic Chucking Machine to turn vital, high-precision hydraulic pump parts for U. S. Army tanks. The job called for extreme accuracy, because these pumps are filled under pressure with an exceptionally light oil.

To avoid leakage these extremely close tolerances had to be held—40 to 63 micro-inch finish on surface finishes, .002″ on forming, .0008″ to .001″ on turning, and .001″ in concentricity. Maintaining such accuracy with previous methods was difficult—scrap loss was too high. Production had to be speeded up.

The Warner & Swasey Automatic took the function of holding these close tolerances out of the operator's hands—substituting the automatic operation of this high-precision machine for the job. Production was doubled—in some cases tripled! Scrap loss was reduced 12 to 15%!

This type of consistent accuracy is just not possible by manual methods due to the human error of even the best machinists. It is even unusual for an automatic. But the Warner & Swasey 1 AC has the rigidity, the *built-in* accuracy, plus the ability to repeat accurate settings to handle the *most difficult* jobs!

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

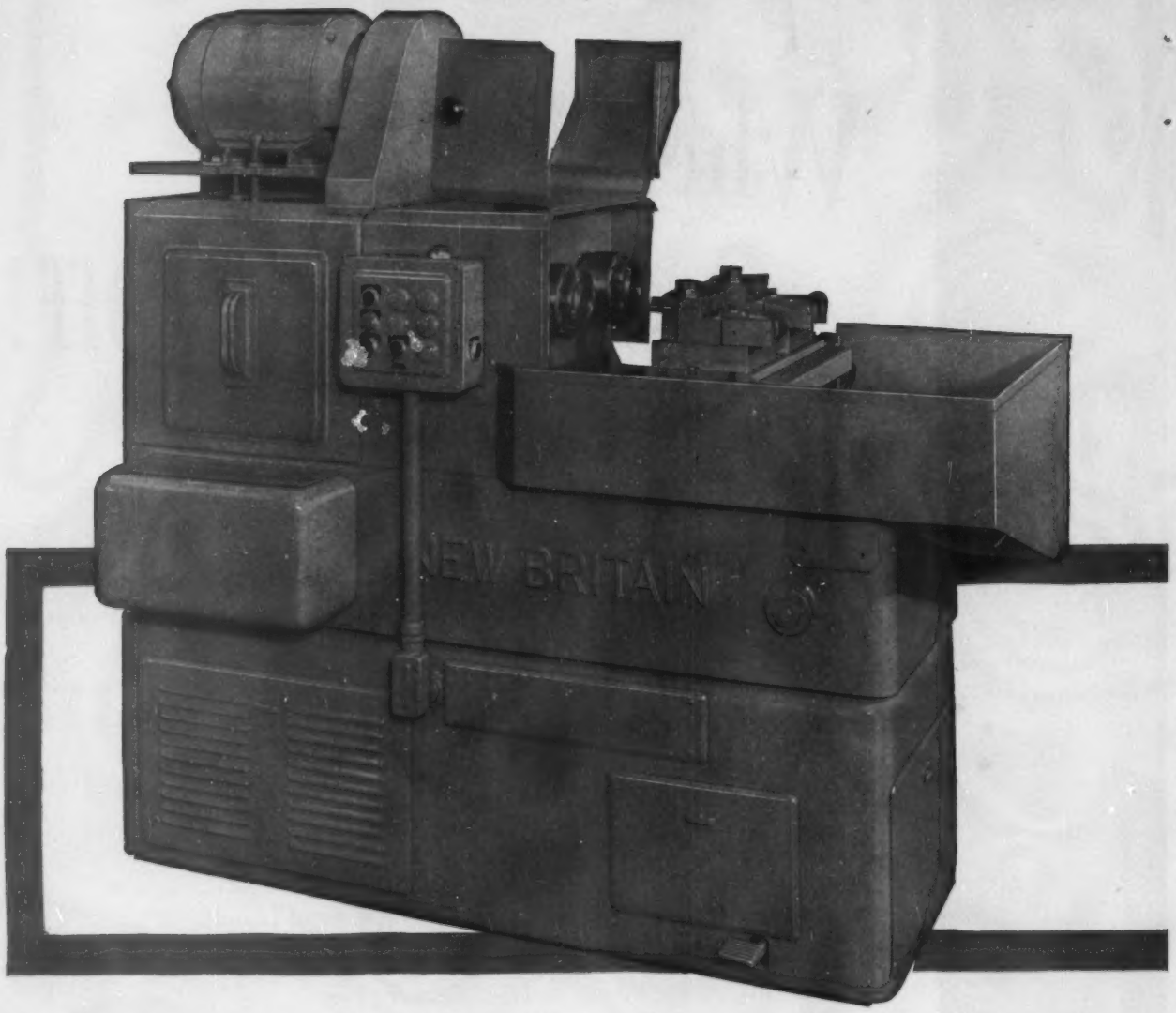
SINGLE SPINDLE AUTOMATICS

1 AC CHUCKING MACHINE
8″ or 10″ Chuck—6″ Working Stroke

2 AC CHUCKING MACHINE
10″ or 12″ Chuck—9″ Working Stroke

SWASEY MACHINE TOOLS, TEXTILE MACHINERY, CONSTRUCTION MACHINERY

The Advantages of PERMANENTLY



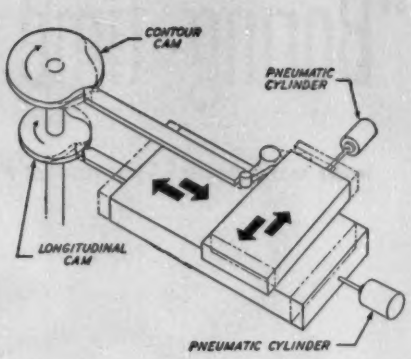
New Britain's exclusive application of cam control (illustrated diagrammatically on the opposite page) gives your tool engineer a completely new approach to tooling for complex pieces. Methods impossible on other types of machines can be employed to speed production and eliminate second operations.

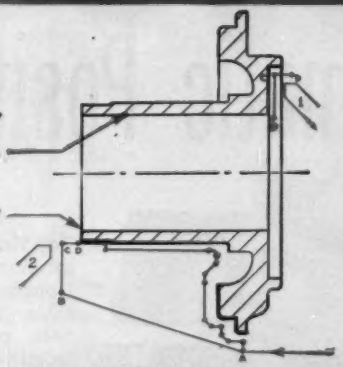
A New Britain precision boring machine will not only turn out a wide variety of work at high speeds, but, because of New Britain's exclusive method of cam actuation, will continue producing them with the same repetitive accuracy — piece after piece, week after week.

Write for descriptive literature on the New Britain boring machine line, including the details of a variety of specific parts turned out on New Britains.

Cam Actuation....
PRESERVED in New
Britain's Precision Boring Machine

- Cam shaft, as well as super precision spindles and their motor drive solidly and permanently mounted to frame for continuing accuracy.
- Rugged precision lever transmits cam motion to cross slide.
- This exclusive method means simple permanently accurate compound slide motion for an endless variety of single point tool paths.





With conventional methods, pieces like this present a problem of costly tooling. With New Britain's new approach, tooling this piece is fast, simple and economical with a single chucking and two single point tools.

When you invest in Boring Machines PICK THE MAKE WITH THE EARNED REPUTATION.

THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut

Our general catalog is filed in the Sweet's Machine Tool Catalog File.

NEW BRITAIN *Automatics* NB

Machines for Making Progress

AUTOMATIC BAR and CHUCKING MACHINES • PRECISION BORING MACHINES
LUCAS HORIZONTAL BORING, DRILLING and MILLING MACHINES
NEW BRITAIN +GF+ COPYING LATHES

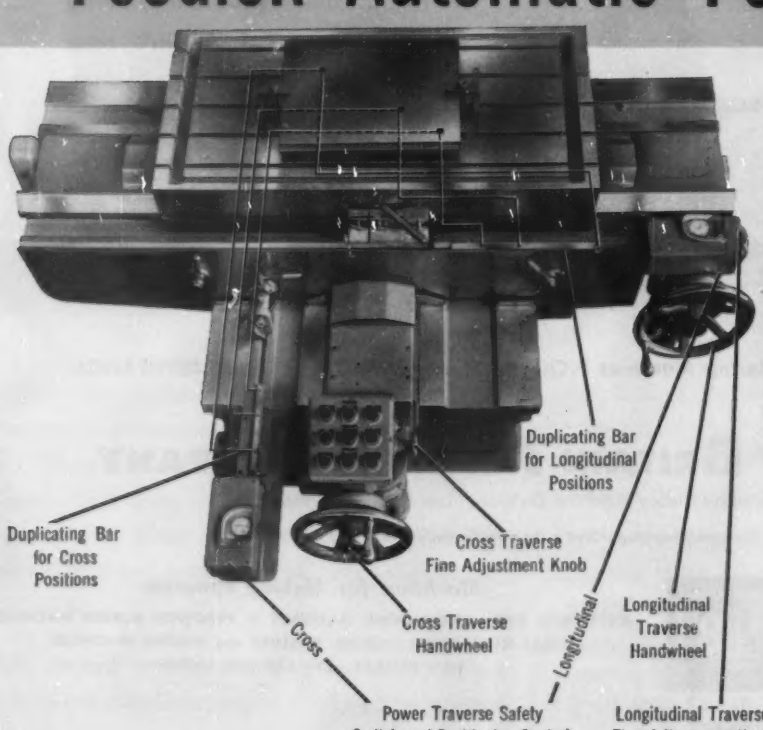
Here's another reason it pays to get a proposal from Fosdick

"Boring time cut 25% on 'one-time'

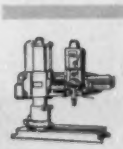
with our Fosdick Automatic Positioning Jig Borer," says Hiser Jig Grinding Co.

"We had to hold a tolerance of ±.0005" on the index and some 30 locating and bushing holes on a multiple spindle drill jig. This jig is used to drill a housing control valve for the power steering attachment of a large automobile manufacturer. Using our Fosdick Jig Borer with Automatic Positioning, we were able to hold this tolerance easily and finish the job in record time. Our Fosdick takes care of our large variety of precision drilling and boring operations on tools, dies, gages, fixtures and jigs. We are glad we got our proposal from Fosdick."

Fosdick Automatic Positioning



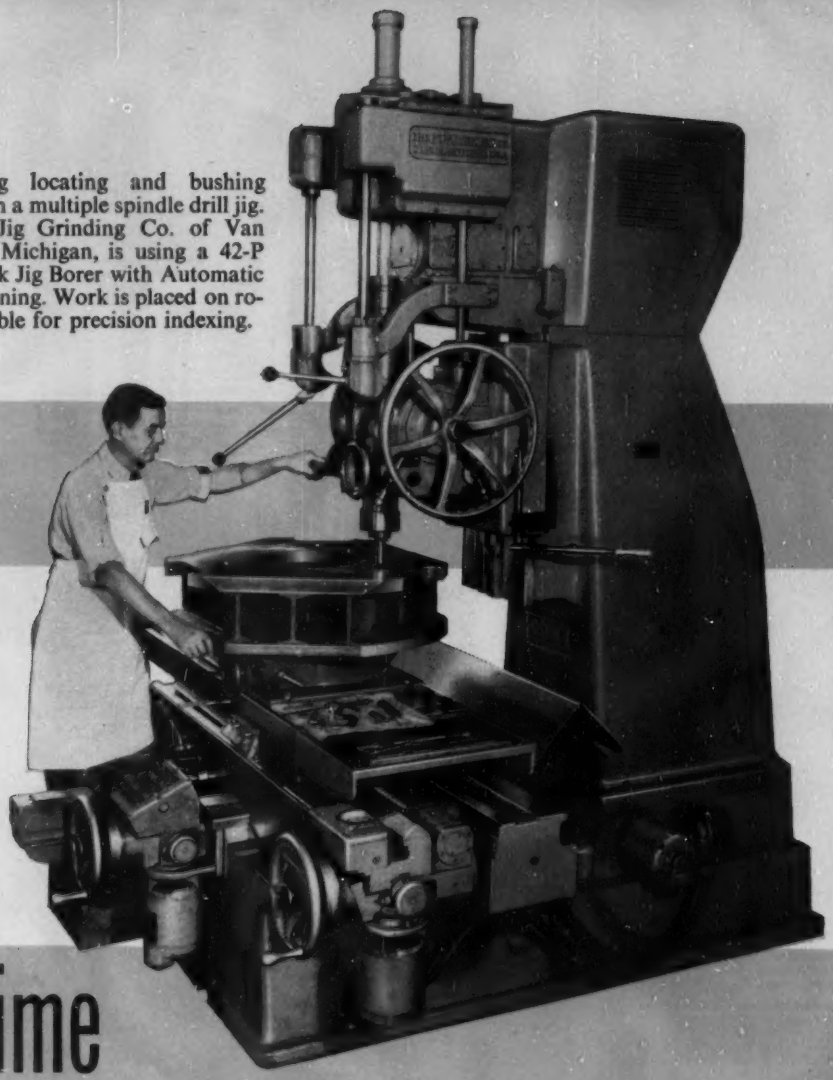
Top view of positioner showing location of duplicating bars in troughs, typical job set-up of table. Note how bars locate hole centers in the work, lengthwise and crosswise. For operator convenience, bars are located within easy reach. Holes in bars are keyed with letters and numbers to identify them at a glance with holes in the work. On "one-time" jobs, measuring rods can be used in place of bars.



Radial Drills

Drilling locating and bushing holes in a multiple spindle drill jig. Hiser Jig Grinding Co. of Van Dyke, Michigan, is using a 42-P Fosdick Jig Borer with Automatic Positioning. Work is placed on rotary table for precision indexing.

jobs



saves time

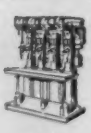
on 'one-time' jobs as well as precision production.

Fosdick builds Automatic Positioning into its Jig Borers to give you ±.0001" table positioning *in seconds* simply by pressing a button. Automatic Positioning can cut the cost of boring jigs, or can eliminate jigs entirely. Gives exact reproduction of drilled, bored, tapped and reamed parts. You get rapid precision in production or one-time jobs, without experienced operators. For fast tool changing with Automatic Positioning, the Fosdick BF Spindle enables you to change tools in seconds, while the machine positions . . . repeating hole size to ±.0001" without resetting.

For full information on the Fosdick Jig Borer with Automatic Positioning, send for Catalog 17P-A.

Need Drilling Equipment? Get a Proposal from Fosdick!

Jig Borers

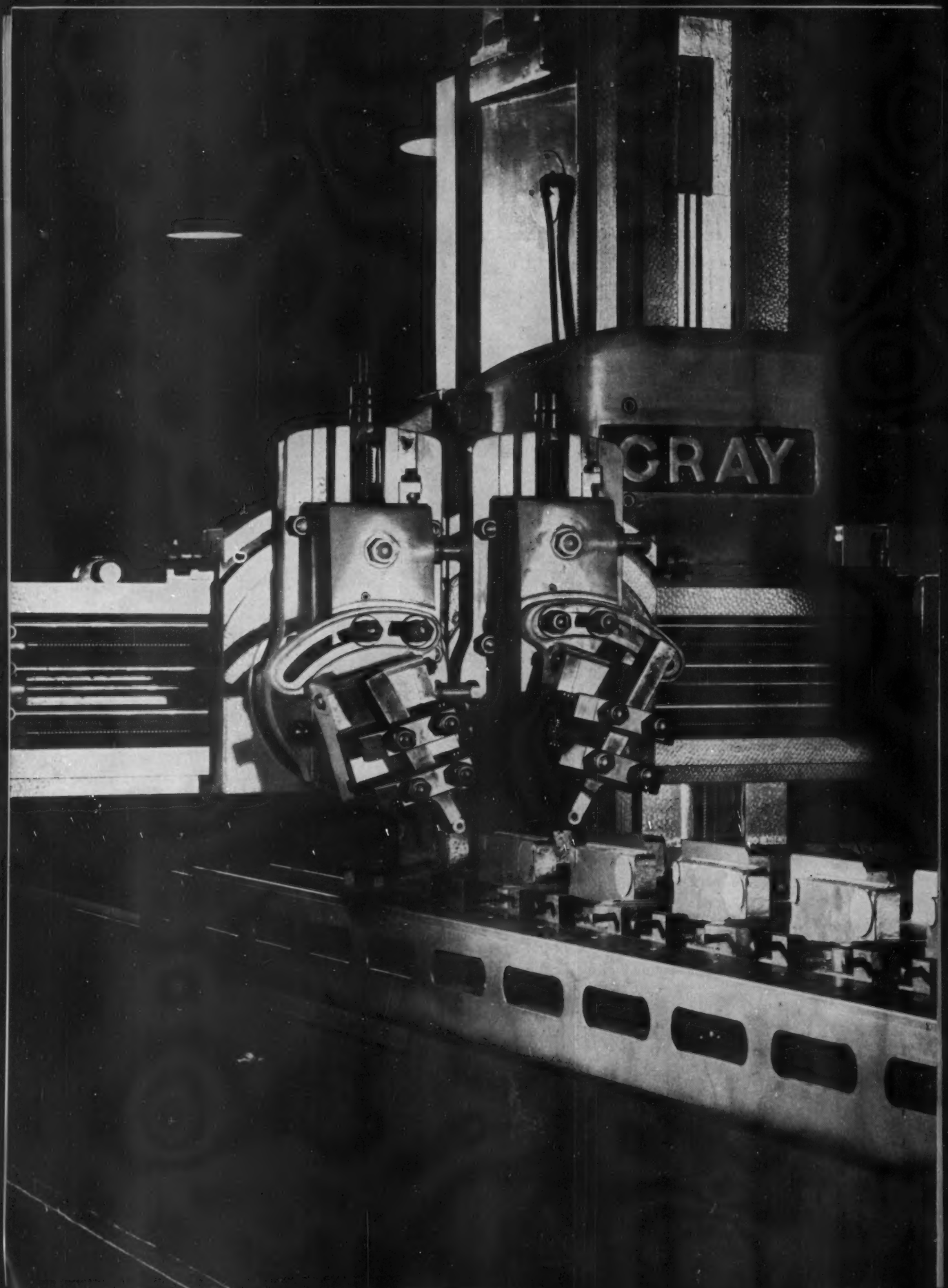

Sensitive and Upright Drills

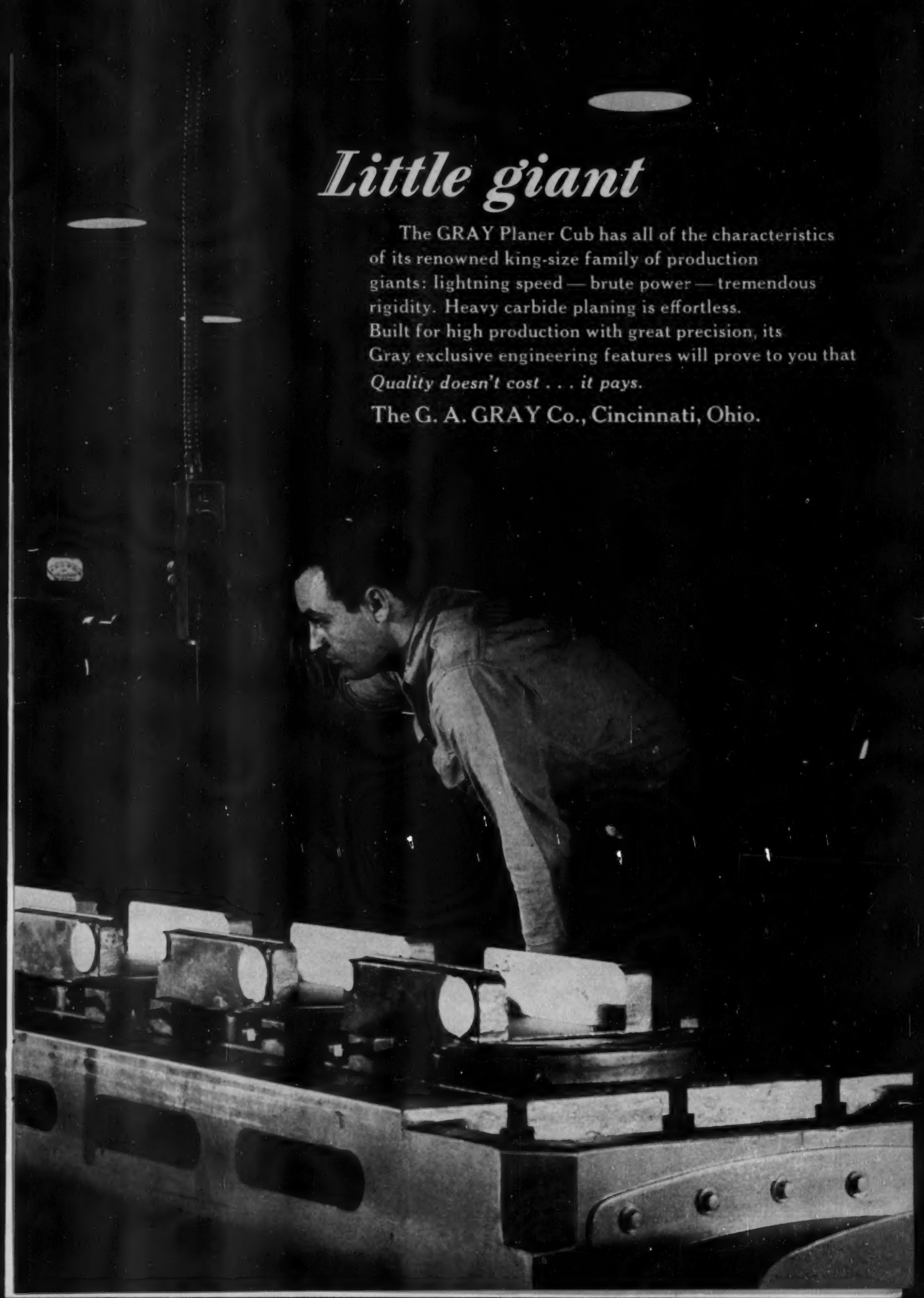
Sensitive Radial Drills

Automatic Positioning Machines

FOSDICK

THE FOSDICK MACHINE TOOL CO., CINCINNATI 23, OHIO


GRAY


Little giant
The GRAY Planer Cub has all of the characteristics of its renowned king-size family of production giants: lightning speed — brute power — tremendous rigidity. Heavy carbide planing is effortless. Built for high production with great precision, its Gray exclusive engineering features will prove to you that *Quality doesn't cost . . . it pays.*
The G. A. GRAY Co., Cincinnati, Ohio.

Here's why users are re-ordering Norton discs

Job reports show how disc grinding can be made more profitable with the money-saving "TOUCH of GOLD"

Typical reports from customers who re-ordered Norton discs

From Tennessee

Job: Wet grinding ends of universal joint spiders, case hardened steel, 58 to 62 R.C., ½" diameter. Rotary work carrier.

Report: Pair of Norton 22" x 2" x 14" discs produced 366,975 pieces without burn — outlasted and outperformed all other discs.

From Indiana

Job: Double disc dry grinding, 6" to 8" diameter cast iron rings, ¾" face, removing .015", .010" and .005" in 3 successive passes.

Report: Norton 30" x 2" x 3½" discs averaged 21,500 pieces, a new high for this job.

From Illinois

Job: Double disc wet grinding hot wound heavy duty coil springs. Reciprocating work holder.

Report: Norton 30" x 3" x 6" discs rated high above competition for output and grinding quality.

From Missouri

Job: Double disc wet grinding cast iron piston rings, roughing operation.

Report: Initial shipment of Norton 30" x 1" x 1" discs produced over 6,000,000 rings — 100% more than competitive discs, with 50% less dressing. Results duplicated in subsequent shipments, establishing Norton discs as best ever received.

From Kentucky

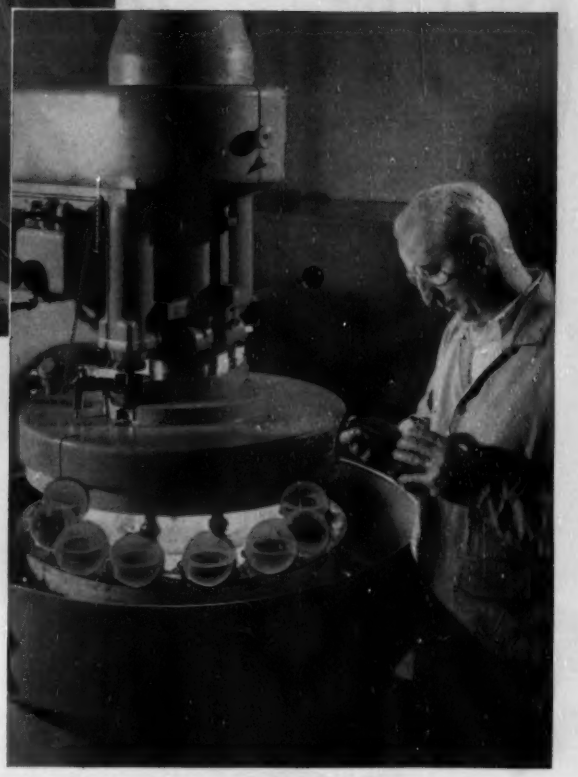
Job: Single disc grinding high-carbon steel inserts, dry grinding ½" x ¼" area.

Report: Norton 18" x 2" x 5" discs outproduced best previous discs 2 to 1.

From Michigan

Job: Tool room surfacing steel jigs and fixtures, single disc, wet grinding small to large areas, up to .125" stock removal.

Report: Norton 18" x 4" x 14" discs gave 20% longer service life than competitive discs.



Once Norton discs are tried, you can give odds that they'll be re-ordered. Freer, cooler cutting action, longer service life and increased production per disc are very good reasons why. Let's look at some other reasons:

- Norton discs are engineered to give best results over the entire range of disc grinding — from snagging to lapping, single or double surfacing, wet or dry grinding, large or small areas — on every type of disc grinder.
- They are made of the famous ALUNDUM* and CRYSTOLON* abrasives, in five bonds and all types of mountings.
- Their wide variety covers all materials ground by this method — metallic or non-metallic, ferrous or non-ferrous, alloys or machine steels, hard or soft.
- They are precision-built for uniform grinding action throughout their service life — from disc to disc and lot to lot.

Norton will engineer discs to your exact specifications — and duplicate these exactly on each re-order. It's the simple, logical way to put the profit-boosting "Touch of Gold" into your own disc grinding operations.

Your Norton Distributor

can give you valuable help in selecting the right discs for your jobs. Ask him for the new booklet "Disc Grinding." Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed under "Grinding Wheels" in your classified phone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Massachusetts. W-1587

Making better products . . . to make other products better

NORTON

and its BEHR-MANNING *division*

NORTON: Abrasives • Grinding Wheels • Grinding Machines • Refractories
BEHR-MANNING: Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries

Added Evidence that—

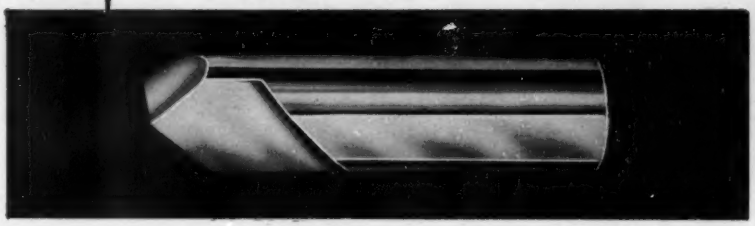
Everyone Can Count on VEEDER-ROOT

REPORTER AT LARGE . . . that's what you might call this new Veeder-Root Reset Magnetic Counter . . . adaptable to remote counting from machines or processes to central boards or instrument-clusters, wherever you want to put them. NOW . . . what can your imagination do with these few facts? For the *full facts,* write:

VEEDER-ROOT INCORPORATED
"The Name That Counts"
HARTFORD 2, CONNECTICUT
Chicago 6, Ill. • New York 19, N. Y. • Greenville, S. C.
Montreal 2, Canada • Dundee, Scotland
Offices and Agents in Principal Cities

"Counts Everything on Earth"

ATRAX IN ACTION



RECORDS SHOW 500% INCREASE IN PRODUCTION WITH IMPROVED BORING TOOL BIT

A CASE HISTORY: One of our customers had experienced considerable difficulties in boring tapered holes in stainless steel. The specifications called for extremely close diameter and taper tolerances, and a finish requirement of ten micro-inch. The carbide tool previously used gave the customer a production of one piece part, containing eight holes, per eight-hour day. With the new Atrax superior finish ground boring bit, production increased to about five piece parts per day. One tool bit roughed out and finished eight holes before resharpening was necessary, and the finished product was eight micro-inch or better. Atrax Solid Carbide Tool Bits improved production in this instance by over 500%.

Possibly our engineers or sales representatives can help YOU achieve similar savings. You'll find them in all principal cities, ready to consult without any obligation.

NEW! Complete 88-page Manual and Catalog of Carbide Tools. Write for your free copy.

THE ATRAX COMPANY

NEWINGTON 11, CONNECTICUT

Fall Foliage "The Color Line" FPG Photo

BULLARD

The Invisible Background of Industrial Progress

It is often said that the best things in life are free. Certainly the scenic joys provided by Mother Nature defy the greatest talents of man. Nothing is more awe-inspiring than a drive or trip over the highways and byways of our great land in the fall when Nature is in her fullest splendor. This is a privilege within the grasp of everyone.

Manufacturers of transportation equipment such as automobiles, busses and railroad locomotives and cars; and manufacturers of road-building equipment including trucks, bulldozers, road rollers, road scrapers and mechanical shovels have recognized that Bullard *Modern Machine Tools* are efficient manufacturing units — the ultimate in their field — another example of "The Invisible Background of Industrial Progress."

THE BULLARD COMPANY · BRIDGEPORT 2, CONNECTICUT

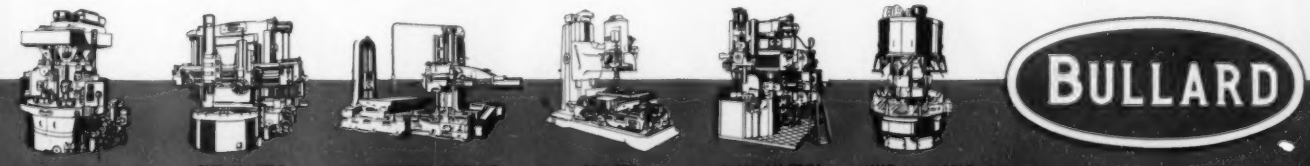
Bullard Contin-U-Matic

Type "RD" with 4–6 and
12 Spindles in 10"–14"–20"

Do you need increased production? Do you want to lower your costs? Then investigate the advantages of a Bullard Contin-U-Matic.

A case study of one of our customers reflects how a Bullard Contin-U-Matic provided the answer to their problem. Production on a reverse ring gear as previously machined was 38 pieces per hour. With a slight change in the holding fixture and tooling, the Contin-U-Matic method showed a great production increase over the former boring machine method. The customer is now machining 122 pieces per hour at 75% efficiency — *a productive increase of better than 220% over the previous type of equipment.*

We invite you to avail yourself of Bullard Engineering Service by calling your local Bullard Sales Office or writing to The Bullard Company, Bridgeport 2, Connecticut — phone EDison 6-2511.



Barber-Colman

FORMED CUTTERS

designed for peak milling efficiency, consistent form duplication, accuracy and long cutting life

Cutters specially designed and manufactured for your form milling operations give you greater cutting efficiency, the most practical means of combining cuts, and reduced milling costs. Depending upon the accuracy you require, these cutters can be furnished with either ground or unground form.

Barber-Colman uses new manufacturing controls and production equipment to give you the most accurate, long-lived formed milling cutters available.

For your special form milling requirements, call a Barber-Colman cutter specialist. He will be glad to assist you with your particular production needs.

BARBER COLMAN ®

Barber-Colman Company

GENERAL OFFICES AND PLANT, 8130 ROCK STREET, ROCKFORD, ILLINOIS

Specialists in

milling cutters, profile or formed, ground or unground thread milling, special problems

It MUST have been good!

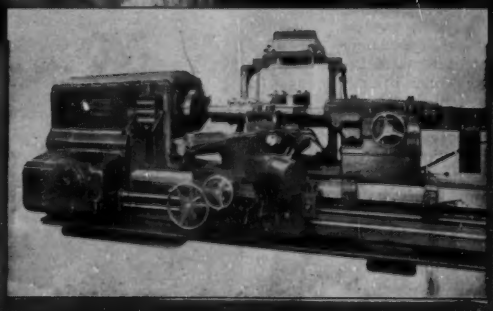
There are times when expressions speak louder than words.

Here's a group of distinguished steel mill roll executives watching a demonstration on a 26" Capacity "AMERICAN" Hydraulic Roll Lathe—judge for yourself whether or not they are satisfied with what they saw.

These machines are performing "miracles" in savings in many of the best known roll shops in the country. They have introduced a brand new machining technique that has revolutionized the art of roll turning. They reproduce work shapes from a template faithfully and accurately not only on steel mill roll bodies and necks, but on such work as spindles, motor shafts, valve stems, step shafts, piston rods, axles and a wide variety of chucking work having irregular contours.

Evidence from hundreds of installations proves beyond a shadow of a doubt their leadership as top-flight cost reducers. Was there ever a time when cost reduction was more urgently needed?

If it's proof you want just drop us a line—no obligation.



THE AMERICAN TOOL WORKS CO. Cincinnati 2, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

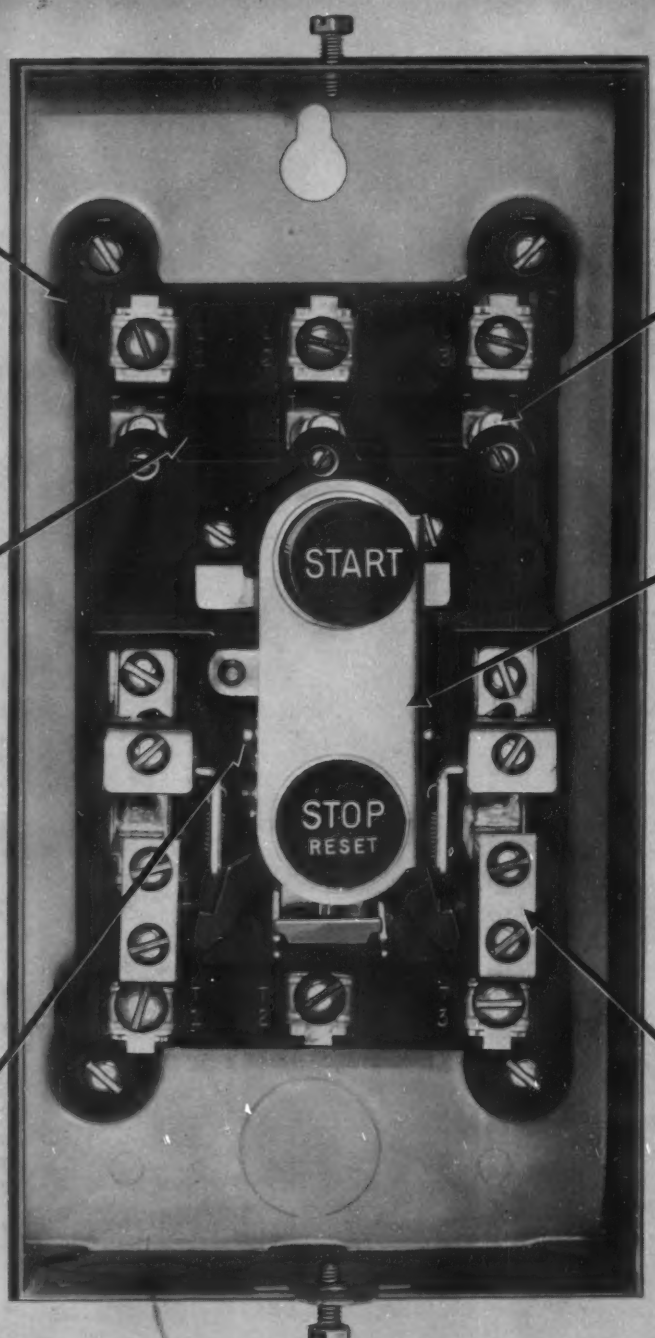
6 Reasons Why . . .

G-E MANUAL STARTERS GIVE MAXIMUM

INSULATED BASE. The starter's molded insulated base provides maximum protection from grounding. Barriers to isolate contacts and reduce arcing are made from hot molded material which doesn't absorb moisture. They have sufficient protection against arc-overs, and also act as mounting supports for the switch.

ARC PROTECTION. Arcs are completely confined, even with maximum horsepower and stalled rotor current, in deep insulated wells. This feature provides a high safety factor by reducing the possibility of arc-over between adjacent contacts and results in increased contact life.

SAFE FROM VIBRATION. The snap-action switch mechanism is built so it cannot accidentally trip from machine vibration. Both push button and lever types help protect against inadvertent operation. Guard on toggle-type switch cover prevents accidental tripping, yet is large enough for operation by a gloved finger. The handle guard provides a means for padlocking switch in either ON or OFF position. For fractional horsepower motor switches, a new handle guard incorporating these safety features is available.



SPLIT-SECOND BREAK. Operating mechanism is spring-loaded for split-second breaks which reduce possible arcing and contact freezing. Made of fine silver, contacts give years of make and break operations. Large contact surface assures positive contact on make.

TRIP-FREE MECHANISM. On G-E manual starters, the operating mechanism trips free on overload, opening the contacts. This action makes it impossible for the switch to be held closed under injurious overload conditions. Visual indication is given by the lever or push button in the neutral position.

NO INJURIOUS OVERLOADS. Bi-metallic overload relays allow your motor to deliver maximum power without premature tripping, yet help protect against overloads and stalled rotor conditions. This positive protection helps prevent damage to the motor due to heating. Bi-metallic overload relays, unlike the solder-pot type, can be mounted in any position. Easily installed heaters are available in all ratings.

PROTECTION

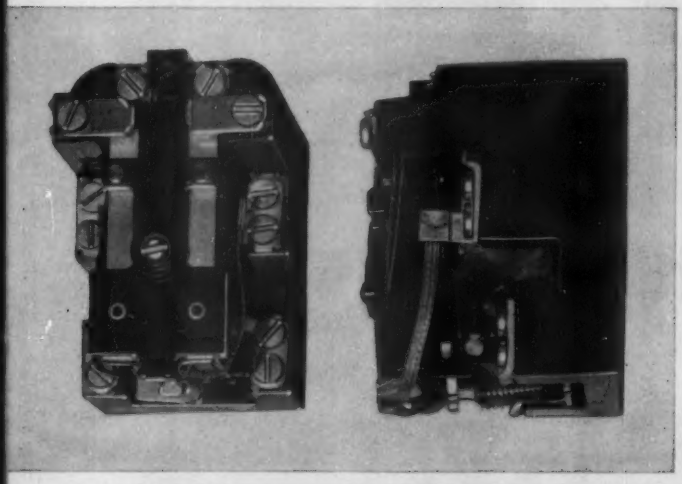
Maximum protection, inside and out, is provided by G-E manual starters. In addition to the features illustrated at left, protective devices have been built into the enclosure itself. Provision has been made for padlocking starter cover (toggle types may also be padlocked in ON or OFF position) to help protect personnel.

ADDITIONAL FEATURES of G-E manual starters include front-connected, clamp-type terminals; straight-thru wiring; general purpose, water-tight, dust-tight and explosion-proof enclosures; clearly marked line and load terminals; and operating mechanisms that are replaceable as units.

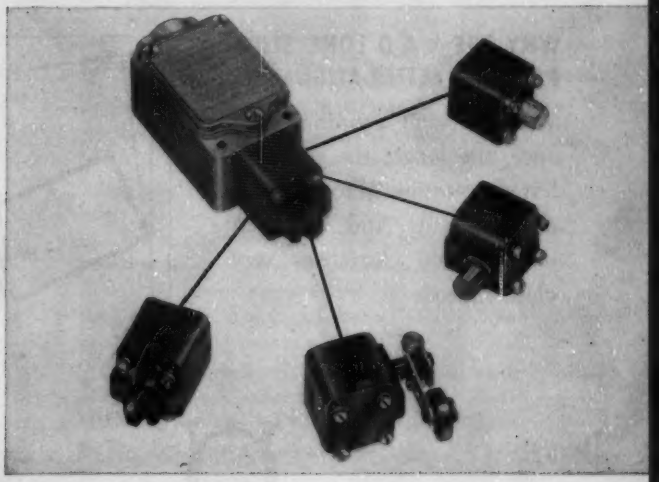
FOR MORE INFORMATION contact your nearest G-E Sales Office, or Distributor, or write Section 730-54, General Electric Company, Schenectady 5, N. Y. Ask for Bulletin GEA-1522.

EASILY ACCESSIBLE MOUNTING KNOCKOUTS in top, sides, bottom and back of case simplify installation. Knockouts are punched for ½ or ¾ inch conduits. Straight-thru wiring, adequate wiring space and saddle-type clamping terminals make wiring easy.

DEPENDABLE RELAYS, LIMIT SWITCHES FOR VARIED APPLICATIONS

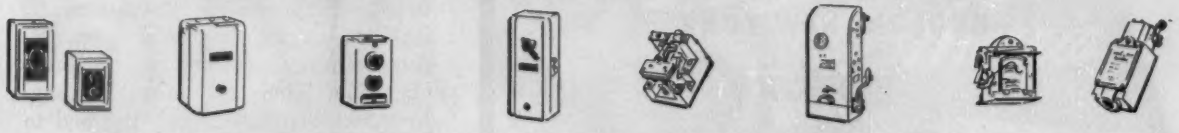


Small size, general-purpose relays are high current rated. Both a-c and d-c forms are available in ratings up to 300 volts. The new, strong, long-life shunt assures dependable relay performance.



Compact, track-type limit switch has four interchangeable heads: roller lever, side pushrod, top pushrod, and roller pushrod. Heads mount in any of four 90-degree operating positions.

CHOOSE FROM THE COMPLETE GENERAL-PURPOSE CONTROL LINE



MANUAL STARTERS — MAGNETIC STARTERS — PUSH BUTTONS — COMBINATION STARTERS — RELAYS — REDUCED VOLTAGE STARTERS — SOLENOIDS — LIMIT SWITCHES

GENERAL ELECTRIC

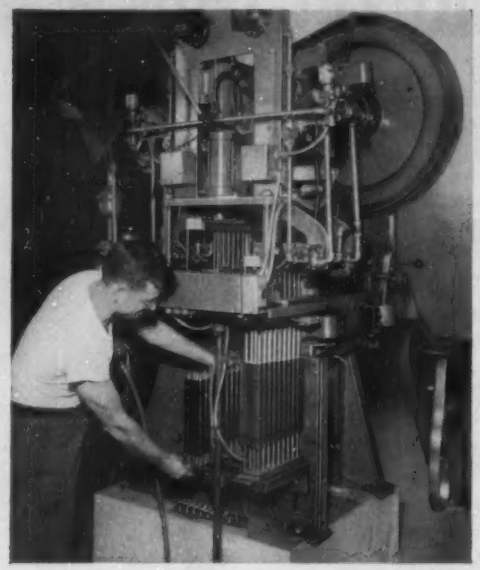
■ Automation needs exceptionally accurate, sturdy, trustworthy production machines. The high cost tooling and complex accessories do not permit anything less.

V & O has known all this for 65 years. The first V & O presses were designed because no others were adequate for automated tooling. The long slides, hand scraped ways, sturdyized features of V & O presses all were created for automation; all have been time-tested on highly automated operations. Our new controls and devices are designed solely for automation.

At V & O, automation is not a "new trend" with which to catch up. V & O never has had any other trend. That is why V & O presses can so easily put you ahead of the automation parade.

Write for the full story.

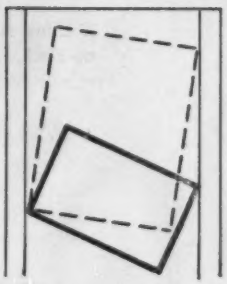
At the York Corporation plant this V & O corrugates, punches and flares copper fins; forms spacers; and stacks fins on copper tubes; all on a single machine.

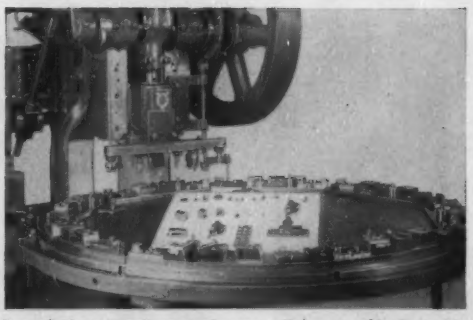


why FOLLOW automation?

WHY THE V & O LONG SLIDE PROVIDES BETTER ALIGNMENT

With the same running clearance, the longer the slide the less the possibility for angular misalignment. And we keep our running clearances very close indeed.





Long before the "automation craze" began, this 8 station dial feed V & O assembled the parts shown here, at the rate of 12 assemblies per minute.

THE V & O PRESS COMPANY

DIVISION OF EMHART MFG. CO.

HUDSON, NEW YORK

65th Anniversary

BUILDERS OF PRECISION POWER PRESSES AND FEEDS SINCE 1889

NEW PNEUMATIC CLUTCHES

V & O is now equipping presses with time-tested pneumatic clutches modified to provide improved economy, compactness and simplicity in press operation. They are unusually long-lived, self-ventilated, and designed to operate indefinitely with minimum maintenance. They increase the advantages of automation — and of better tooling.

a tough job... an easy solution

...another MORRIS MOR-SPEED production machine

OPERATIONAL CYCLE:

Station	1	Load and Unload
Station	2	Drill two 57/64″ holes Drill four 29/32″ holes
Station	3	Spot face six holes
Station	4	Ream (.9062″) two holes

Drilling six large holes in armor plate forgings is no cinch, but when you want a finished part every minute and twenty seconds, that's a tough problem. To Morris Engineers, it was a familiar problem... precision drilling on a mass production basis!

The machine furnished was a MOR-SPEED Four Station Vertical, giving "special machine" production and precision at remarkably low cost. Standard base, rear column, indexing table, slide and hydraulic feed mechanism are combined with special multiple drilling head and work fixtures . . . to make up this high production machine.

Consider the savings . . . investment, labor, time and floor space . . . offered by Morris MOR-SPEED Machines. Precision high production can be yours for less than you might imagine!

Ask your Morris representative for details on our deferred payment plan.

Morris

933 HARRIET STREET CINCINNATI 3, OHIO

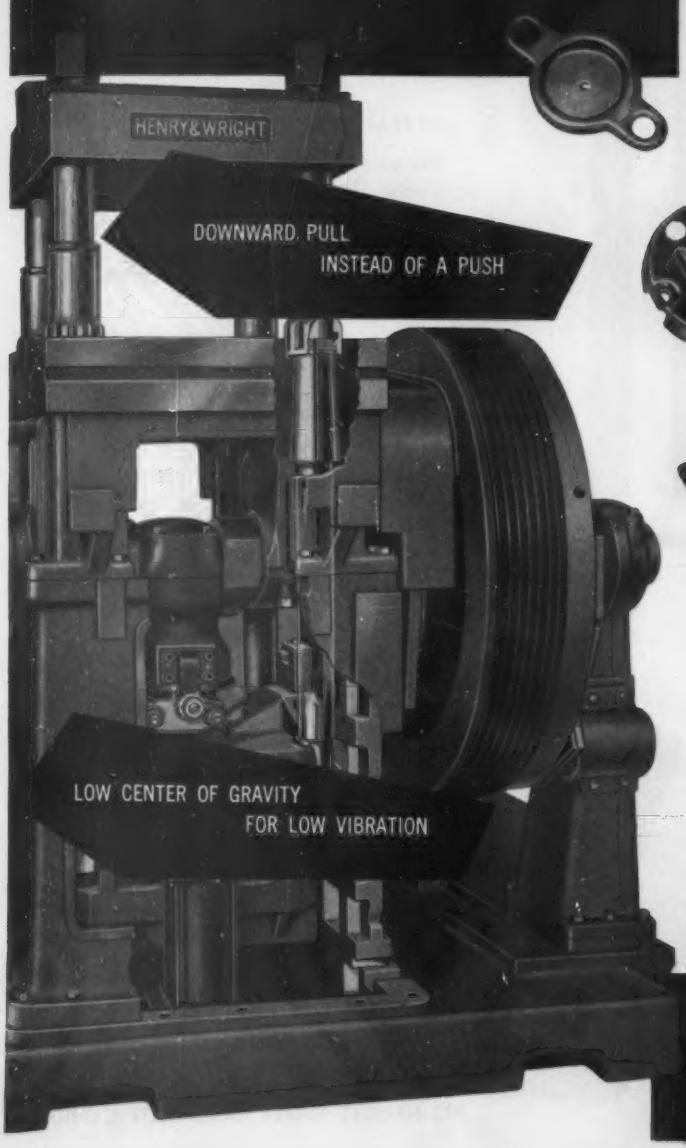
YOU CAN LINE UP JOB AFTER JOB

The Henry & Wright Dieing Machine is easy enough to set up so that moderate production runs are profitable.

You can schedule one job after another. Your H & W will get the work out, get it out right, and have it done when the schedule says it ought to be done.

Simple jobs that you want to complete at high speed. Close tolerance work. Tricky reverse bends. Full assemblies at one pass through the press. They all will go through your Henry & Wright, and with surprisingly short interruptions for setting up.

Four corner control of side thrust, and a downward pull instead of a push: These are two of the reasons why your Henry & Wright will withstand more off-centering of the die loads. Jobs like those shown can be easily run in sequence on an H & W.



Henry & Wrights are making production runs that designers never had dreamed could be stamped at a profit. Our representative would like to show you some of the pieces.

Please write to Henry & Wright, 481 Windsor Street, Hartford, Connecticut.

H&W®

HENRY & WRIGHT

DIVISION OF EMHART MFG. CO.

HARTFORD, CONNECTICUT

How many dimes can YOU save

from every lubrication dollar?

Simplify and Save the Pure Oil way

6-WAY SAVINGS!

1. Simplifies Lubrication
2. Speeds-Up Application
3. Minimizes Mis-application
4. Cuts Down Inventories
5. Eases Stock Control
6. Streamlines Purchasing

Be sure with Pure—Sales offices located in more than 500 cities in Pure's marketing area.

Now's the time to start tightening up on production and maintenance costs. And the place to start—one place where really dramatic savings often can be made—is on *lubrication*.

Pure Oil multi-purpose lubricants—*the specially-formulated lubricants that do many different jobs equally well*—enable you to make a six-way savings that amount to real money. What's more, your lubrication program becomes *surer*, simpler, more efficient . . . saves time, saves machines, saves money!

For complete information on this cost-cutting program, clip out the coupon and mail it today. It's the first step toward big lubrication savings!

It Starts Here!

PURE OIL INDUSTRIAL LUBRICANTS

FREE BOOKLET

The Pure Oil Company, Industrial Sales Dept. A-410
35 E. Wacker Drive, Chicago 1, Illinois
Please send me your free booklet on how to "Simplify and Save."

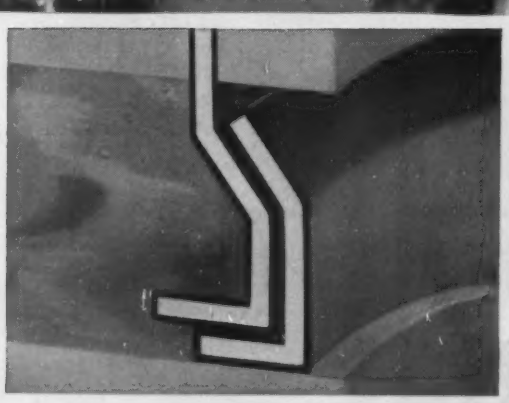
NAME_____

POSITION_____

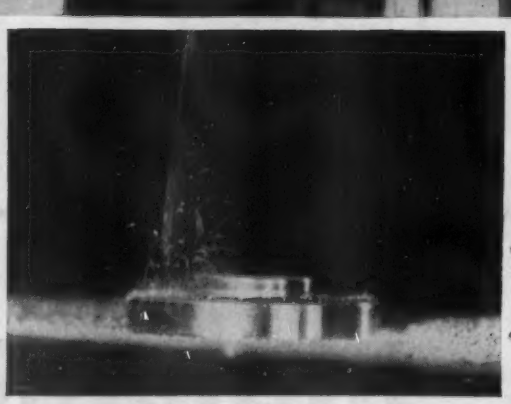
COMPANY_____

ADDRESS_____

CITY_____ ZONE_____ STATE_____



POSITIVE LABYRINTH. A joint is only as effective as its seal. Countless research studies have shown that the labyrinth is one of the most effective ways to seal a joint where at least one member rotates. Further sealing action is achieved by the film of grease that fills the minute clearance between the two seals.



FLINGER ACTION. One of the most important functions of the outer rotating seal is to throw off any foreign element that tries to enter the bearing. This flinger action is achieved by the centrifugal force set up by the rotating seal. Elements attacking the bearing are repelled.

Exclusive 4-way seal guards new Life-Line A bearing

Here's why you can count on reliable Life-Line A motor performance

There are three factors that affect motor bearing life: (1) type of lubricant, (2) amount of lubricant, and (3) presence of contaminants. The one *sure* way to control all three is to use a bearing that is pre-lubricated at the bearing manufacturer's plant and then SEALED.

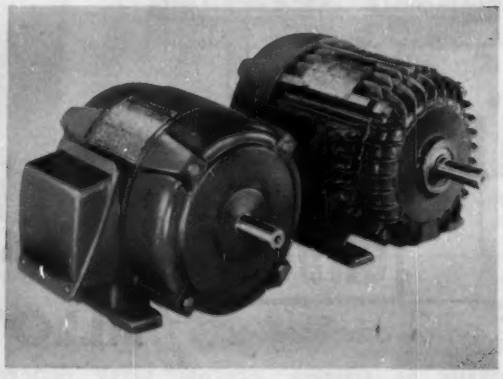
Many of the original Life-Line® pre-lubricated bearings installed in 1937 have been running ever since and are still like new. Now, Westinghouse offers another important step ahead... a pre-lubricated motor bearing that has *four* seals... two on each side. Here's real bearing protection. Grease is sealed in. Contaminants are sealed out. No on-the-job greasing is required—EVER.

This new concept in motor bearings is one of the many improvements Westinghouse has incorporated into the complete, balanced design system that makes the Life-Line "A" motor your best buy. Get all the facts from your local Westinghouse sales engineer. Or write for Booklet B-6154-A. Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21849

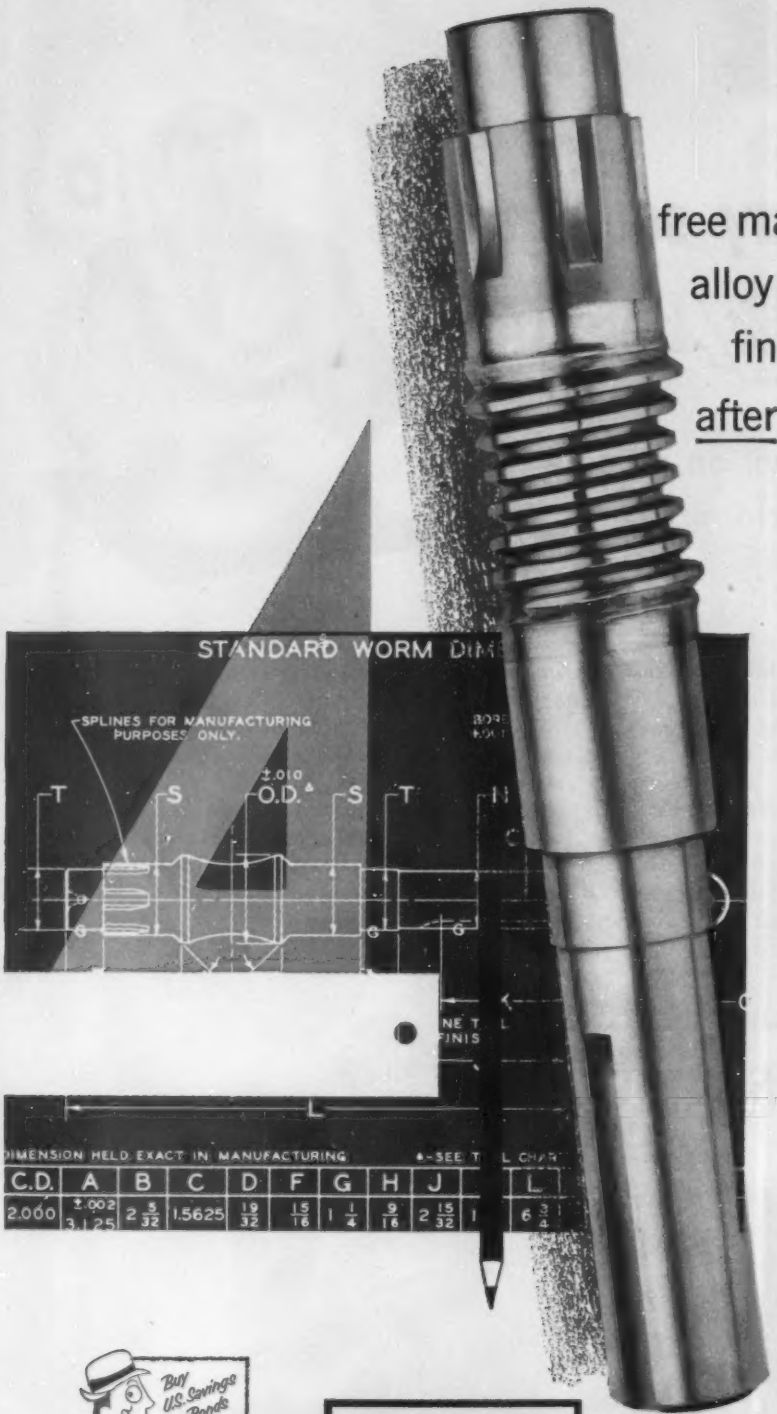
YOU CAN BE SURE... IF IT'S

Westinghouse

AIR BY-PASS. Totally-enclosed motors "breathe" as the internal air expands and contracts with change in temperature. Ordinary motors "breathe" along the shaft and through the bearings. Life-Line provides an air by-pass around the bearings to keep out contaminating air.



The performance of any motor is dependent on the performance of each component of that motor. It takes balanced design. That's why every component in the new Life-Line "A" motor has been redesigned and integrated with the whole. The result is a motor with superior performance and consistent dependability.



free machining MAX-EL alloy steel worm finish machined after full heat treatment...

This double enveloping worm of Crucible MAX-EL® 3½ alloy steel, made by Cone Drive Gears, Division of Michigan Tool Company, was completely machined *after full heat treatment.*

As our customer writes: "This requires an extremely free-cutting material in order to secure desired accuracy, and we have used MAX-EL quite successfully, due to its free machinability in the heat-treated state (Rockwell C 35-38)."

But try MAX-EL for yourself. You'll find that its free machining qualities, freedom from distortion, deep hardening characteristics, and the longer tool life you will get from its use, will help your production line run smoother. For further information, and *fast* delivery of MAX-EL – *call Crucible.*

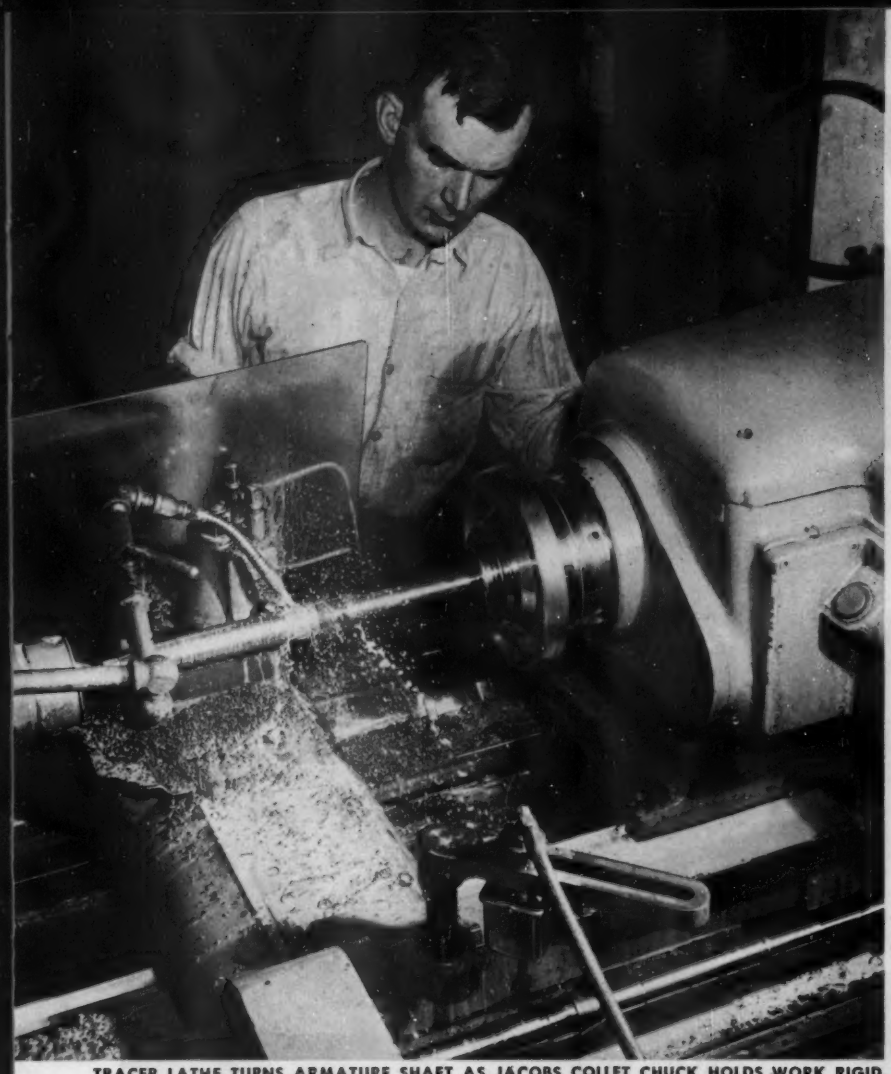
CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **ALLOY STEELS**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

Branch Offices and Warehouses: ATLANTA • BALTIMORE • BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DAYTON DENVER • DETROIT • HOUSTON • INDIANAPOLIS • LOS ANGELES • MILWAUKEE • NEWARK • NEW HAVEN • NEW YORK • PHILADELPHIA • PITTSBURGH PROVIDENCE • ROCKFORD • SAN FRANCISCO • SEATTLE • SPRINGFIELD, MASS. • ST. LOUIS • ST. PAUL • SYRACUSE • TORONTO, ONT. • WASHINGTON, D. C.

Canadian Distributor — Railway & Power Engineering Corp., Ltd.



TRACER LATHE TURNS ARMATURE SHAFT AS JACOBS COLLET CHUCK HOLDS WORK RIGID.

SHAFT IS INSERTED AT AN ANGLE by Walter B. Best, operator. This is allowed by the flexibility of the collet and greatly reduces tailstock resetting adjustment.

COLLET GETS IMPACT TIGHTENING. Handwheel hammer lugs deliver an impact blow on impact sleeve inside handwheel. Force exerted is several times greater than in ordinary hand tightening.

JACOBS SPINDLE NOSE LATHE CHUCK permits use of maximum speeds and feeds on modern tool room lathes. Chucks any bar between 1/16" and 1 1/16". The world's finest collet chuck.

COLLET PERFORMS GRIPPING FEAT

Rubber-Flex Collet jaws close down on work with parallel bearing that defies slippage

International Equipment Company in Brighton, Massachusetts has high praise for a unique collet it uses. The collet daily delivers the tightest, most accurate grip ever devised in lathe collet equipment — 2 to 4 times the gripping power of split steel collets.

This Jacobs Rubber-Flex Collet, the heart of the Jacobs Spindle Nose Lathe Collet Chuck, provides an absolutely parallel grip over the entire bearing surface. Its multiple, long steel jaws are locked together with oil resistant synthetic rubber and offer a length of bearing that is 50–75% greater than can be obtained in split steel collets.

The full 1/8" range of the collet permits chucking bars with variable outside diameters.

"Eleven of these collets have the gripping range of eighty-eight split steel collets," points out Evan Anderson, Assistant Foreman, Maintenance Division.

The collet's radically different construction is considered, by tool engineers, one of the most outstanding developments in modern tool history. Jacobs Spindle Nose Lathe Chucks, known all over the world, are stocked and sold by your Industrial Supply Distributor. The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

IF IT'S A

JACOBS

IT HOLDS

Jacobs and your local distributor

are ready to deliver the chucks you need and the service you deserve.

. . . first in chucks

. . . first in service

NEW! Automatic Multi-Cycle Tracer Control for SUNDSTRAND Automatic Lathes*

You can now obtain Sundstrand Automatic Lathes with tracer control for multi-cycle single point turning of irregular shapes. The lathes can be provided with a template controlled tracing slide mounted to the regular front carriage.

With this attachment and controls, ruff, semi-finish and finish cuts can be taken with one turning tool in one automatic cycle. The control can be set up for one, two or three cycles depending on job requirements. The regular cross feeding rear slide can be used to square up shoulders, chamfer, etc. Cycle changing is quick and easy requiring only 5 to 15 minutes depending on the number of facing tools required in the job set-up.

* This attachment is available for factory installation only on new Sundstrand Automatic Lathes.

SUNDSTRAND

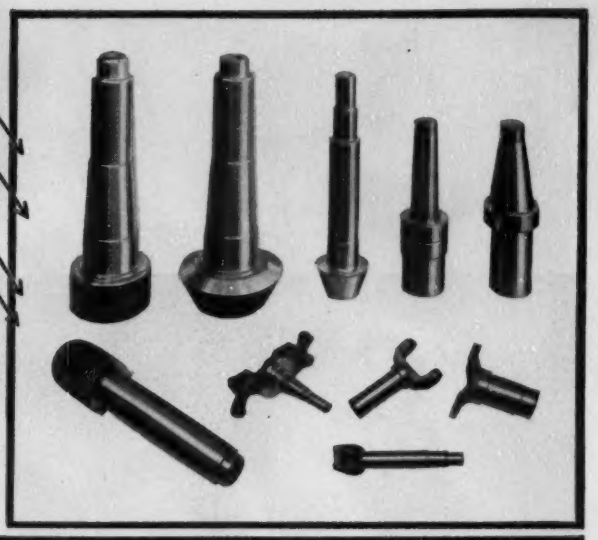
"Engineered Production" Service*

*REG. U.S. PAT. OFF.

AUTOMATIC LATHES | SIMPLEX RIGIDMILS | DUPLEX RIGIDMILS

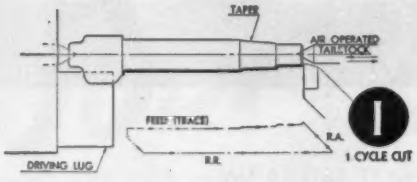
For Parts Like These

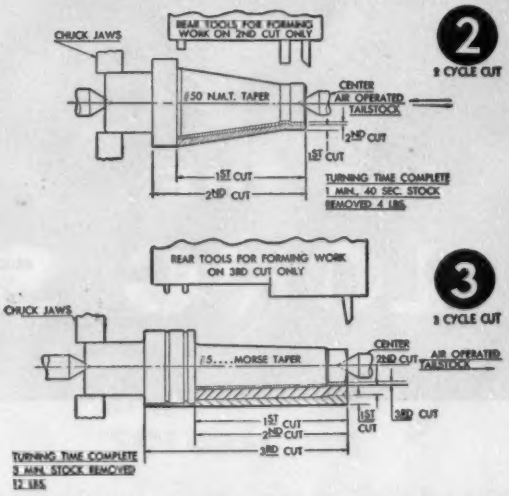
Illustrated at the right are typical parts that can be turned on a Sundstrand Automatic Lathe with the new Sundstrand Multi-Cycle Tracer Control. The pinions, stub arbors and universal joint parts illustrated are just a few of many that can be turned efficiently on this equipment. The diameters and tapers are turned with simple single point tools. Small lots or large can be handled easily and quickly.



Typical Tooling

These sketches illustrate stock removal and tooling for a one cut, two cut or three cut job. The lengths and depths of the first, second and third turning cuts and the cross feed of the rear slide are automatic and part of the machine cycle. Changing over to a different job is easily done in a matter of minutes.





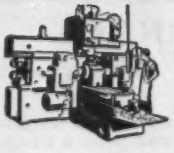
Features

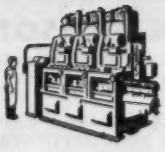
1. Easily changed over for different jobs. 2. One template for all three cuts. 3. Change-over time to standard operation approximately 45 minutes. 4. Three turning cuts in one automatic cycle. 5. Cross feeding rear slide operates in automatic cycle for facing, grooving, chamfering, etc. 6. Because of the complete automatic cycle one operator can run several machines.

Free Data

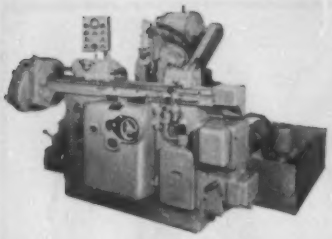
Additional information is available in this new folder. Write for your copy today. Ask for bulletin No. 148.

TRIPLEX RIGIDMILLS | SPECIAL MACHINES





SUNDSTRAND
Machine Tool Co.
2533 Eleventh St. • Rockford, Ill., U.S.A.



YOUR CHOICE OF 3 METHODS FOR ACQUIRING NEW MACHINE TOOLS ON A SOUND BASIS

Jones & Lamson Machine Company now offers a 3-way marketing service to users of high-efficiency metal-cutting tools. This service, initiated by J&L after intensive study, covers every need and clears up all confusion on the problem: to lease or not to lease. You may buy outright . . . buy on a 1-to-5 year basis, at interest rates as low as 3¼%*. . . or you may lease on any of 4 variations of a rental plan. Write or phone Jones & Lamson Machine Company for full information and dependable advice.

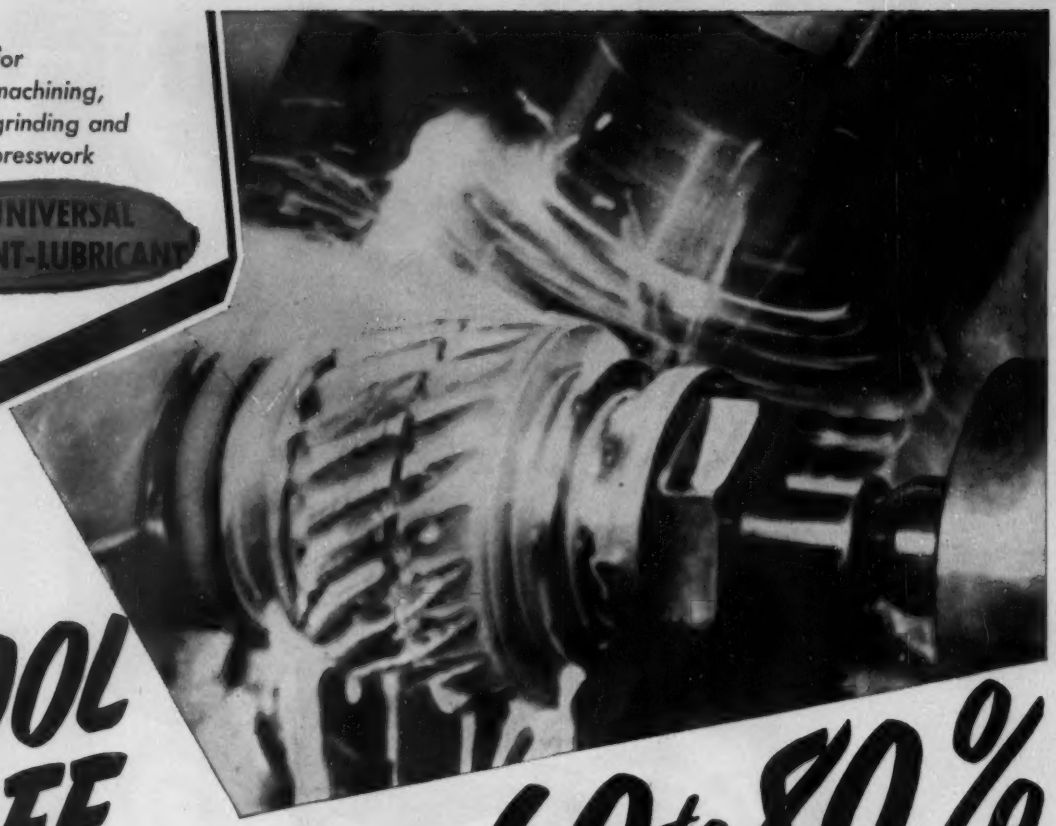
*(add-on rate)

JONES & LAMSON MACHINE CO.
502 Clinton St., Springfield, Vermont, U.S.A.

UNIVERSAL TURRET LATHES • FAY AUTOMATIC LATHES • AUTOMATIC DOUBLE-END MILLING & CENTERING MACHINES
AUTOMATIC THREAD & FORM GRINDERS • OPTICAL COMPARATORS • AUTOMATIC OPENING THREADING DIES & CHASERS

for machining, grinding and presswork

A UNIVERSAL COOLANT-LUBRICANT



TOOL LIFE BOOSTED 60 to 80% WITH SHEAR-SPEED SOLUBLE OIL!

machine down-time cut in the production of gears for a large auto manufacturer.

●

Convince yourself of the **amazing** advantages and versatility of SHEAR-SPEED Soluble Oil in your own plant. Sold only on a **satisfaction guaranteed** test basis. Write for **Bulletin SO-53** and price list.

●

IMPARTIAL TESTS of two highly-rated cutting fluids vs. SHEAR-SPEED Soluble Oil were run under *exactly similar production conditions:* ***same machine, same parts, same cutting speed, same coolant flow, same tool grinding***

	Cutting Fluid X	Cutting Fluid Y	SHEAR-SPEED Soluble Oil	S/S Soluble Oil Gave This:
Average No. gears cut per grind	177.6	193	228	More pieces per grind
Tool stock removed per grind	.0227"	.0288"	.0188"	Less tool wear
No. of grinds per .375" hob wear	16	13	20	Longer tool life
Average tool life	2842 parts	2509 parts	4560 parts	Lower tool cost per piece

SHEAR SPEED
CHEMICAL PRODUCTS

7175 E. McNICHOLS RD. *A Division of Michigan Tool Co.* DETROIT 12, MICH.

ARMSTRONG

Quality TOOLS

NOT A COST, BUT AN INVESTMENT

That Pays Year After Year . . .

Buy ARMSTRONG TOOL HOLDERS and TOOLS for today's jobs and they will bring you added profits thru the years. With ARMSTRONG TOOL HOLDERS you will be permanently tooled up for whatever comes, for each is a multi-purpose tool that takes cutter bits ground to many shapes. Each is an efficient tool, refined thru a half century of world wide use. Each has strength beyond any need, extra strength resulting from endless research and the most modern closely controlled manufacturing methods.

ARMSTRONG TOOL HOLDERS are inexpensive too, for they are produced in great numbers. They are instantly available because they are carried in stock by all leading supply houses in sizes and types for every operation on lathes, planers, slotters and shapers; for standard operations on turret lathes and screw machines. They are profitable in use because they permit the highest speeds and heaviest feeds and "Save: All Forging, 70% Grinding and 90% High Speed Steel."

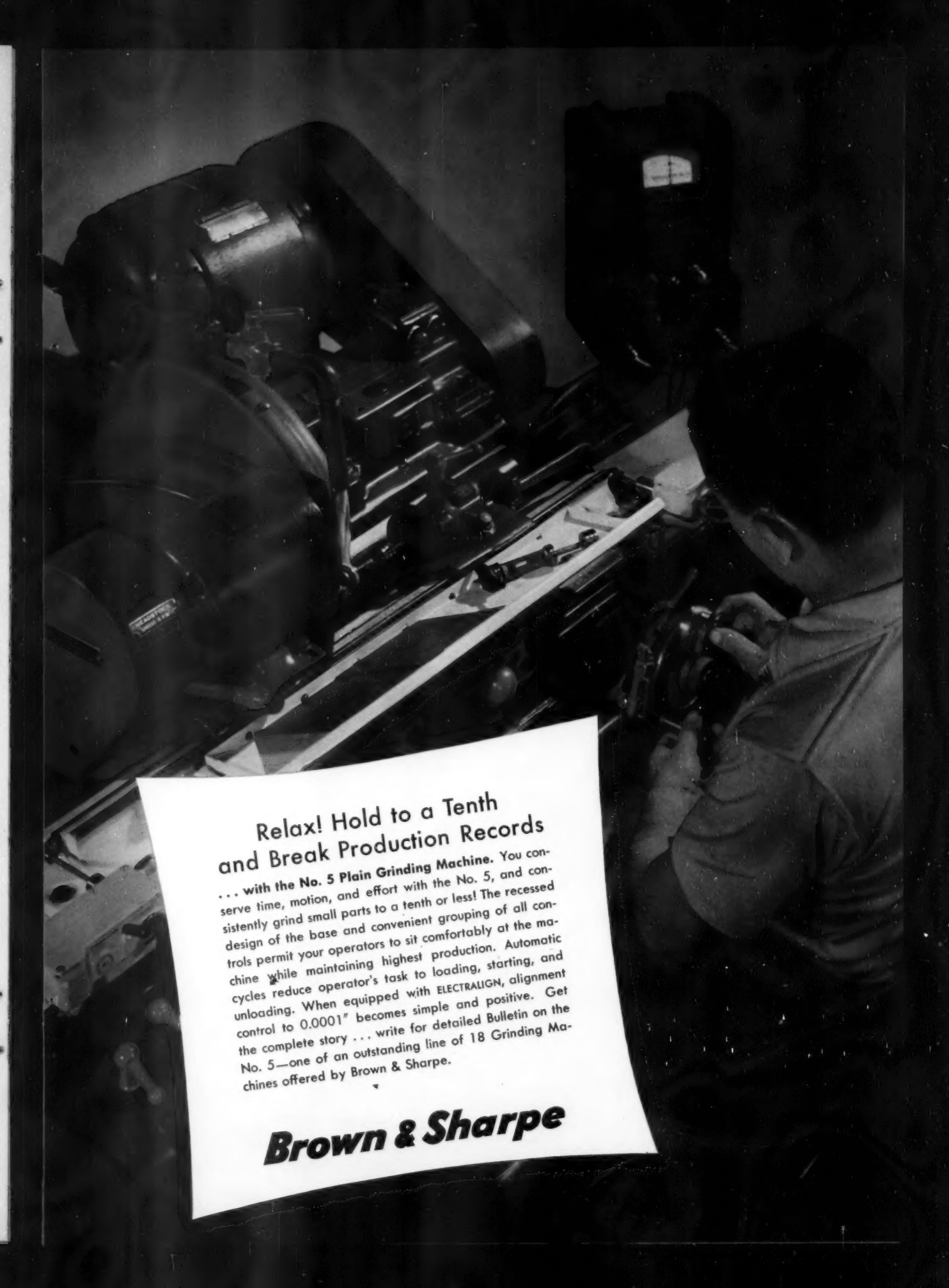
ARMSTRONG Lathe and Milling Machine Dogs are permanent tools too. They are drop-forged from special open hearth steel, are heat treated to extreme stiffness and toughness. They have alloy steel screws hardened at the tip to prevent up-setting and have double life, for hubs are made oversize to permit re-tapping.

ARMSTRONG Quality pays back over and over again. *Write for new S-48 catalog.* It offers many opportunities to conserve profits.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

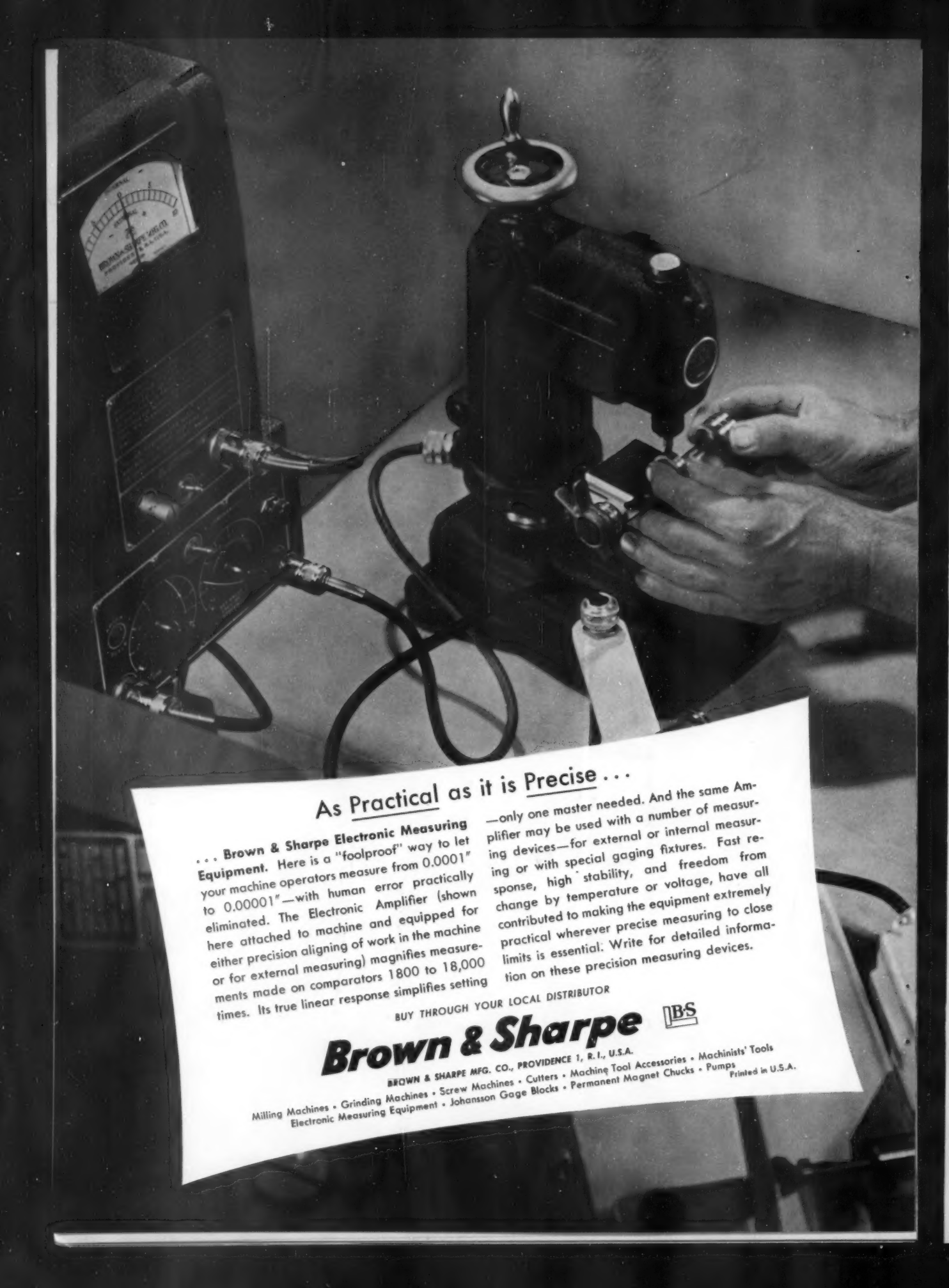
5215 W. ARMSTRONG AVENUE • CHICAGO 30, ILL.



Relax! Hold to a Tenth and Break Production Records

. . . with the No. 5 Plain Grinding Machine. You conserve time, motion, and effort with the No. 5, and consistently grind small parts to a tenth or less! The recessed design of the base and convenient grouping of all controls permit your operators to sit comfortably at the machine while maintaining highest production. Automatic cycles reduce operator's task to loading, starting, and unloading. When equipped with ELECTRALIGN, alignment control to 0.0001" becomes simple and positive. Get the complete story . . . write for detailed Bulletin on the No. 5—one of an outstanding line of 18 Grinding Machines offered by Brown & Sharpe.

Brown & Sharpe



As Practical as it is Precise . . .

. . . **Brown & Sharpe Electronic Measuring Equipment.** Here is a "foolproof" way to let your machine operators measure from 0.0001" to 0.00001"—with human error practically eliminated. The Electronic Amplifier (shown here attached to machine and equipped for either precision aligning of work in the machine or for external measuring) magnifies measurements made on comparators 1800 to 18,000 times. Its true linear response simplifies setting—only one master needed. And the same Amplifier may be used with a number of measuring devices—for external or internal measuring or with special gaging fixtures. Fast response, high stability, and freedom from change by temperature or voltage, have all contributed to making the equipment extremely practical wherever precise measuring to close limits is essential. Write for detailed information on these precision measuring devices.

BUY THROUGH YOUR LOCAL DISTRIBUTOR

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BROWN & SHARPE MFG. CO., PROVIDENCE 1, R. I., U.S.A.

Milling Machines • Grinding Machines • Screw Machines • Cutters • Machine Tool Accessories • Machinists' Tools
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Save Assembly Time...

G.S. SMALL GEARS are widely known for the *impressive* savings they make. Savings in money and time and temper in *so many* assembly lines. ★ *Extreme uniform accuracy* in runs of hundreds or thousands is the unique advantage you get in G.S. GEARS. Rejects drop to an all time low. Downtime disappears. Production flows smoother and faster. Profits mount thru lower costs . . thru the greater satisfaction and service your product gives! ★ You'll benefit, too, by using the vast G.S. experience gained through 38 years of specializing in making better Small Gears exclusively. Tell us exactly what you need . . preferably while the job is on the boards. Our capable craftsmen will be quick to lend you every possible aid.

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See where and how we mass-manufacture Small Gearing to uniformly fine tolerances. Folder contains 23 pictures of Small Gears, plant views, as well as Diametral and Circular Pitch Tables. Ask for your copy on company stationery, please!

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SPURS • SPIRALS • HELICALS • BEVELS • INTERNALS
WORM GEARING • RACKS • THREAD GRINDING

WORLD'S LARGEST EXCLUSIVE MANUFACTURERS
OF FRACTIONAL HORSEPOWER GEARING

"Operations Kingsbury"

These two machines, working as a team, perform an average of 3879 operations per hour, machining 102 interchangeable parts

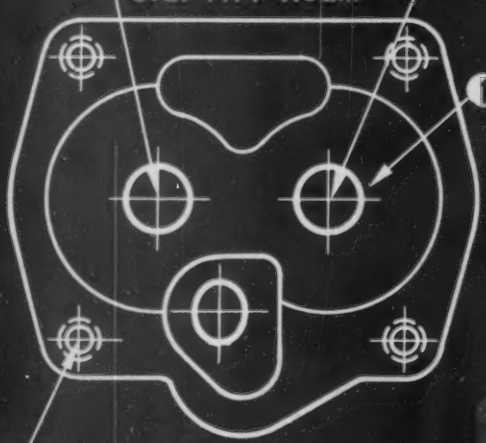
CAST IRON OIL PUMP

Machine 1 — 27 operations from two directions. 17¢ per part

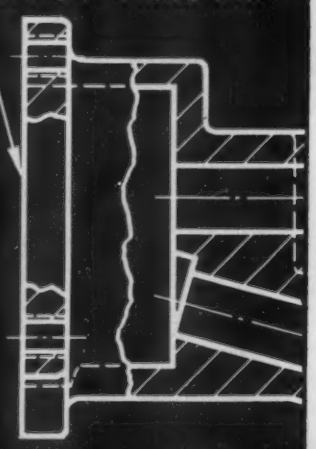
1 .450 HOLE
Sta. 2H Drill thru
Sta. 11H Ream

1 .490 HOLE
Sta. 4H Drill thru
Sta. 12H Ream

1 MILL FACE
Sta. 1V Rough mill
Sta. 3V Finish mill



1 GEAR POCKETS (2)
Rough Bore and
Semi-finish Bore
and Square Bottom
Stas. 5H, 6H, 8H, 9H



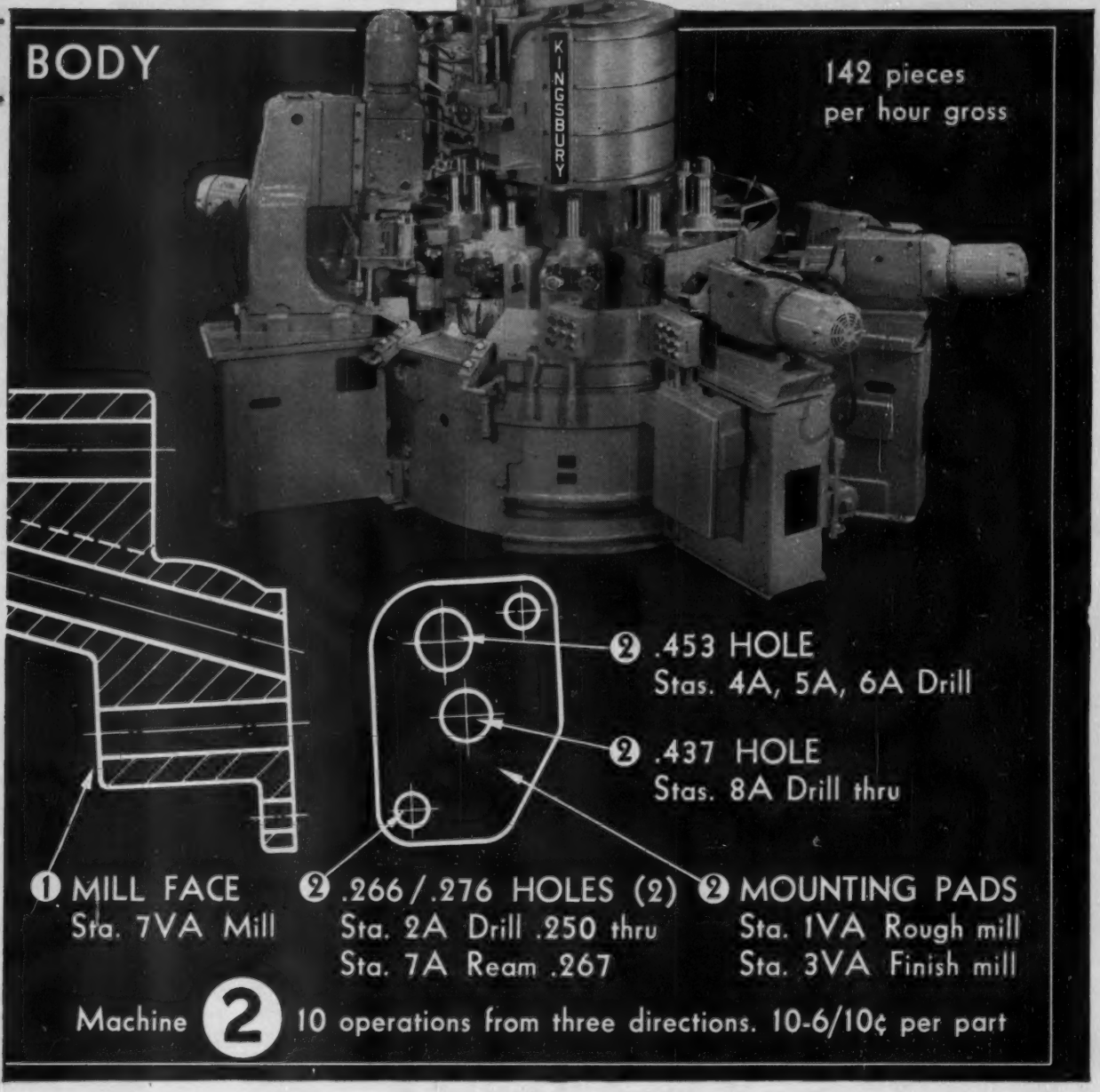
1 4 HOLES 1/4-24
Sta. 2H Tap-Drill 2
Sta. 4H Tap-Drill 2
Sta. 10H C'sink 4
Sta. 13H Tap 4

127 pieces
per hour gross

KINGSBURY
AUTOMATIC DRILLING AND TAPPING MACHINES
for Low-Cost High Production

The blueprint tells only part of this Kingsbury story. The rest is told in Keene, New Hampshire, in one of the most modern machine tool plants in New England. Here Kingsbury engineers study your part specifications — for your Kingsbury must do the operations *you* require at the rate you name.

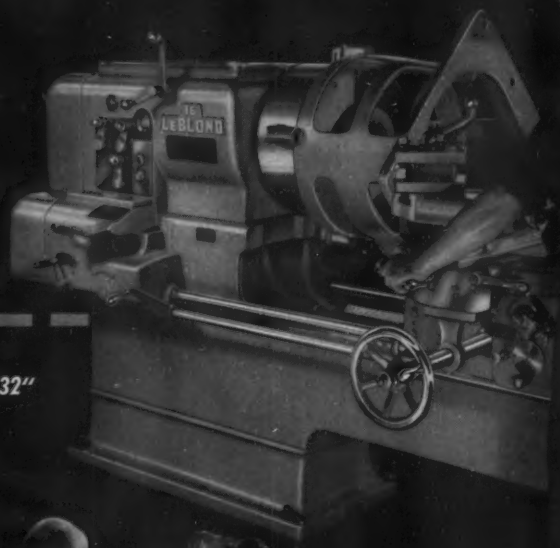
Each Kingsbury machine is custom-built, but it is never built "from scratch." Even the work-holding fixtures, specially designed for each part, are developed from a background of years of experience and knowledge of what is required for accuracy and safety — *and what works*. Every mechanism has been tested in field service. Standard Kingsbury bases, drilling, and tapping units,



indexing mechanisms, lubricating and cutting-oil systems, electrical and mechanical controls . . . all are coordinated in an automatic machine which must perform correctly "first time round" — and year after year in your plant. Perhaps our *mental attitude* has a lot to do with the success of Kingsbury machines. We are specialists. Since 1918 we have built more than 5,000 Kingsburys and we know what a Kingsbury can do. When we tell you a Kingsbury *can* do your job to *your* satisfaction, we're ready to prove it!

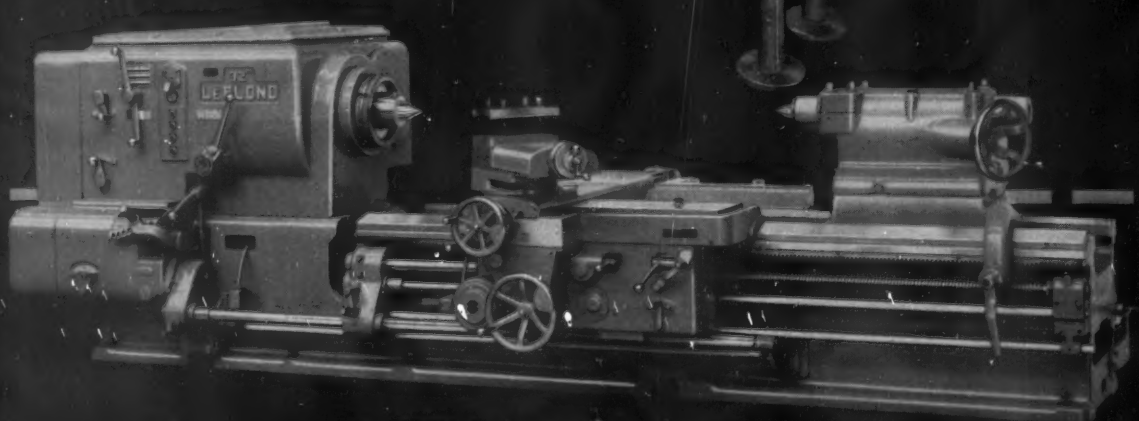
KINGSBURY MACHINE TOOL CORP.
108 Laurel Street, Keene, N. H.

LeBlond sliding



16"/32"

16"/32"



32"/50"

bed gap lathes

4 Sizes, 16"/32", 25"/50", 32"/60" Heavy Duty & 17"/28" Regal

The most versatile lathes in the world give you:

— **Variable gaps for work with large projections**

— **Adjustable center distance for extra-long work**

— **Capacity for all regular engine lathe work**

For complete description and specifications of the 16"/32", 25"/50" and 32"/60" heavy duties ask for Bulletin SBG-103A. 17"/28" Regal, Bulletin RSBG1A

Occasional work with large or irregular projections doesn't warrant buying a large-swing lathe. And extra-long pieces that have to be turned now and then don't justify the cost of a long-bed machine. That's why tool rooms, maintenance departments and contract shops depend on LeBlond Sliding Bed Gap Lathes for *both* out-sized jobs and everyday engine lathe work.

Here's how they work. LeBlond Sliding Bed Gap Lathes are built with two bed sections. The top bed is movable on the lower. With the top bed extended, a wide gap is created providing nearly twice the swing of a conventional engine lathe. Center distance can also be increased greatly allowing long lengths to be turned. With the gap closed this triple-duty lathe does all the work of a heavy-duty engine lathe of comparable size.

LeBlond Sliding Bed Gap Lathes come in four sizes. Three heavy-duties, the 16"/32", 25"/50" and 32"/60"; and a low-cost 17"/28" Regal. These lathes will give you swings up to 61½" and up to 13' distance between centers (base).

And, of course, you get all the well-known LeBlond features. Hardened and ground steel bed ways; low-friction, high-power Spur Gear headstock; totally enclosed quick-change box; automatic lubrication; one-piece apron; thrust-lock tailstock, and many more.

Where utmost versatility is what you need in a lathe, you can't do better than a LeBlond Sliding Bed Gap. Whatever your turning needs may be, one of LeBlond's 76 models is bound to suit. Contact your nearby LeBlond Distributor or write Cincinnati today.

....turned faster by LeBLOND of Cincinnati

THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • FOR MORE THAN 67 YEARS.

Are Your Fasteners HEADED FOR TROUBLE?

Screws are sometimes like people. If they "lose their heads" under pressure — if they turn out to be "softies" — if they don't "square up," they are *headed for trouble*. It takes only a few "bad" screws on the line each day to erase most planned assembly savings.

That is why quality standards for P-K Self-tapping Screws were set so *high* when they were first introduced by Parker-Kalon. Today, with even *higher standards* they continue to take top honors for dependability, despite many efforts to match them.

The difference between screws made to P-K standards and those that are "headed for trouble" are hard to see at a glance, but the effects of screw failure (parts spoilage, high reclamation costs) are quickly evident in mounting assembly costs.

P-K Self-tapping Screws are "headed for savings"—not only headed, but threaded, pointed, and heat-treated with the same purpose, to keep your assembly lines trouble-free. That's why so many more manufacturers of America's best known products specify P-K. For information on any fastening problem, talk to a P-K Assembly Engineer. Or write: Parker-Kalon Division, General American Transportation Corporation, 200 Varick St., New York 14.

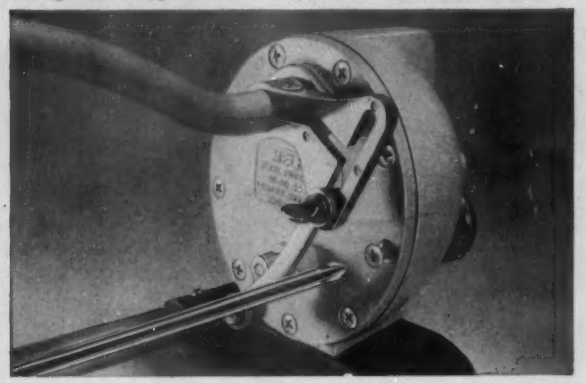
IS HEAD UNDERSIZE?
DO HEADS POP OFF?
IS HEAD ECCENTRIC?
IS SLOT BURRED?
IS SLOT TOO DEEP?
IS SLOT TOO SHALLOW?
IS SLOT OFF CENTER?
P-K STANDARDS make sure you get fasteners HEADED for SAVINGS

P-K STANDARDS protect you against these and many other symptoms of Screws "headed for trouble". They don't "get by" P-K inspectors — that's why *all* P-K Self-tapping Screws can be "Guaranteed First Quality."

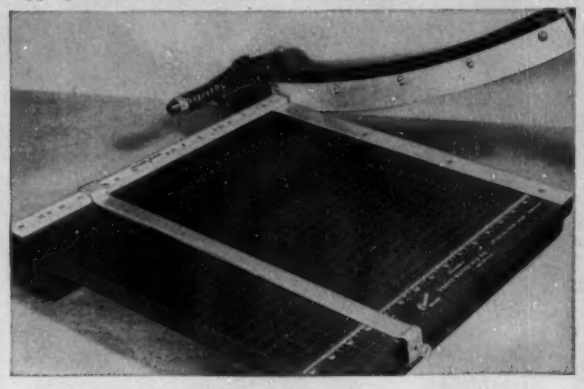
PARKER-KALON

IN STOCK . . . see your nearby P-K Distributor . . .

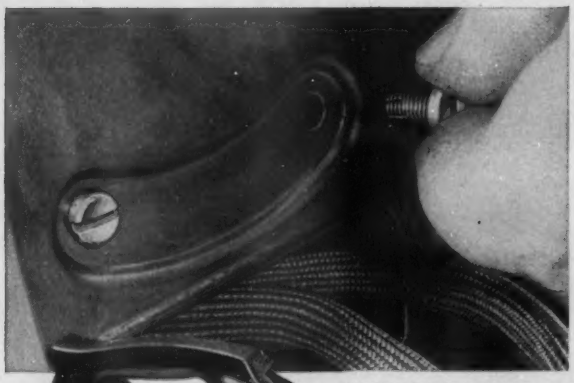
"SWINGIN' SPRAY," MELNOR Products Co.'s popular lawn sprinkler keeps on "swinging" because the oscillating mechanism is separate and sealed from the water intake system. To assure equally dependable assembly strength resistant to the roughest handling, Melnor fastens zinc and aluminum parts with P-K Screws, 7 Phillips Head Type Z and 18 Type F, driven with air tools.

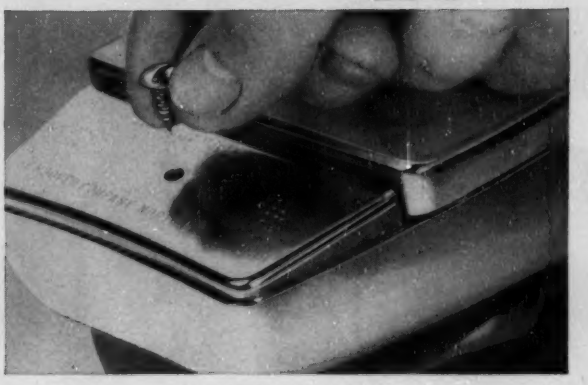


IN THE PREMIER CUTTING BOARD, made by Photo Materials Co. when 21 P-K Type A replaced wood screws to fasten the ruler, straight blade, bearing casting, and bottom cleats to the hard maple board, pilot holes were eliminated. The 5 P-K Type F Screws that now fasten curved blade to cast iron handle ended tapping. Power driving further speeds assembly.



with P-K quality-planned assembly savings pay off





HOOVER SMOOTHED OUT trouble and speeded assembly of this Steam or Dry Iron by switching to P-K Self-tapping Screws for seven fastenings previously made with machine screws. Tapping and lock washers were eliminated. The assembly is made stronger than ever, with an important saving in time. Five P-K Type F Screws fasten the phenol formaldehyde handle to the sole plate cover (left). On the assembly line, these screws are power driven. One P-K Type F Screw fastens the steam valve control support bracket to the die-cast aluminum filler tube at the front of the iron (not shown). One P-K Type A Screw fastens the heel closure plate to the terminal bracket (right).

The Original

SELF-TAPPING SCREWS

your local Supply and Service Specialist

96 Inch Heavy Duty
Betts-Bridgeford Lathe

CONSOLIDATED MACHINE TOOL

Wholly owned subsidiary of Farrel-

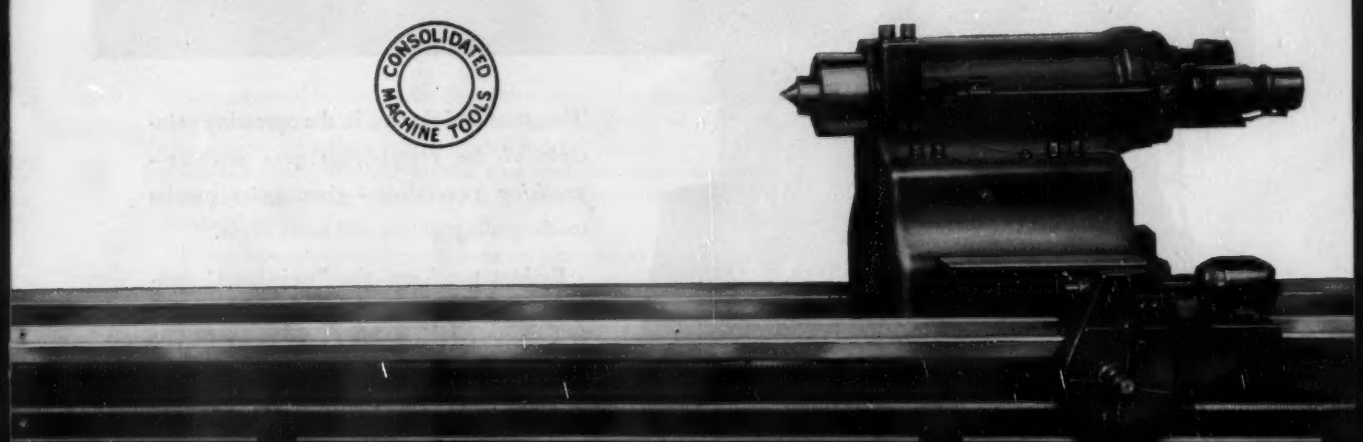
You Can Run This BETTS-BRIDGEFORD LATHE AT THE CUTTING TOOLS!

All of the feeds and all of the 20 to 1 range driving motor speeds are electronically selected and controlled at the cutting tools! Both are infinitely variable and can be changed in fine increments while the tools are cutting!

Push buttons on the control panel traverse the carriage right or left and the tools in or out.

Only for thread cutting or shifting in or out of the face plate drive, does the operator have to leave his working position at the cutting tools.

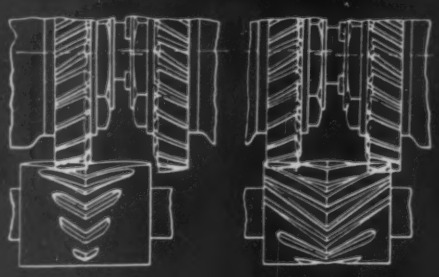
CONSOLIDATED MACHINE TOOLS



CORPORATION, ROCHESTER, N. Y.

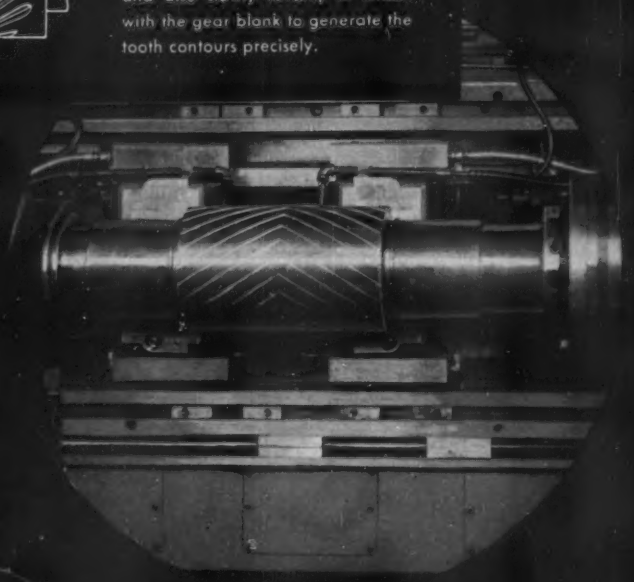
Birmingham Company, Incorporated

TAKE A LOOK AT FARREL-SYKES ACCURACY



PRECISION GENERATION

The cutters of Farrel-Sykes machines reciprocate, one cutting when movement is in one direction and the other when the movement is reversed. Each ends its stroke at the center of the blank. As they cut, they rotate to generate the helices and also slowly revolve in unison with the gear blank to generate the tooth contours precisely.



Start of cutting operation on a continuous tooth herringbone pinion with integral shaft.

The accuracy inherent in the operating principle of the Farrel-Sykes gear machine—*precision generation*—gives gears precise tooth spacing, profile and helix angle.

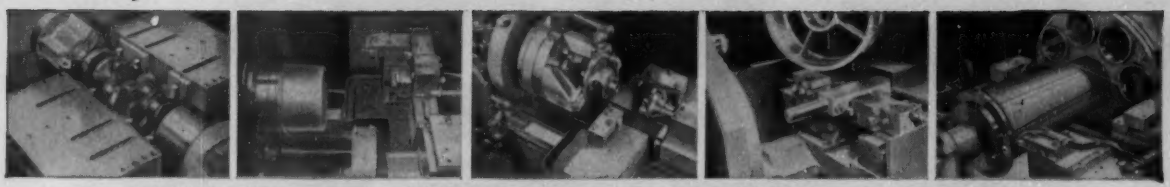
Besides precision, the "twin-head" generator gives you versatility, high production and convenient operation. It makes fast, simple work of cutting every type of herringbone gear, single helical and spur gears, two members of a cluster gear simultaneously, and other toothed and cylindrical forms.

Write now for details of this accurate and versatile gear generator. FB-950

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.

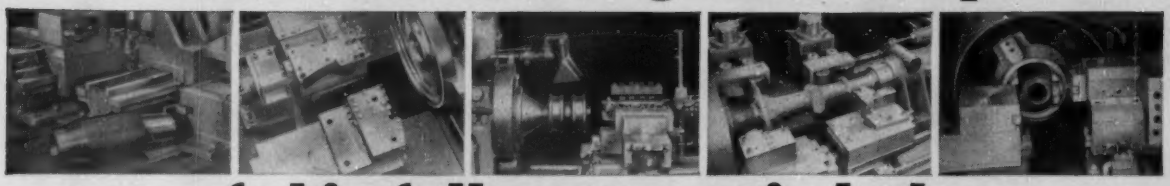
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Cambridge (Mass.), Akron, Cleveland, Chicago, Los Angeles, Houston

Farrel-Birmingham®



All these different tooling setups

show the amazing versatility



# of this fully automatic lathe

...the SIMPLIMATIC

Here's versatility that beats any automatic lathe you ever saw! Actually, the Simplimatic is doing hundreds of jobs like these—jobs that would otherwise be put on *special* machines—built at extra-special cost. But this (and don't miss the important point!) is a *standard machine*—at a *standard price.*

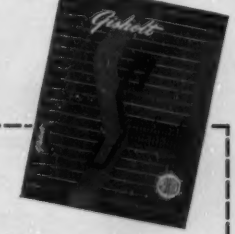
If you have medium or long runs on parts up to 33½" in diameter, get the facts about the Simplimatic Automatic Lathe.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

TURRET LATHES • AUTOMATIC LATHES
SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

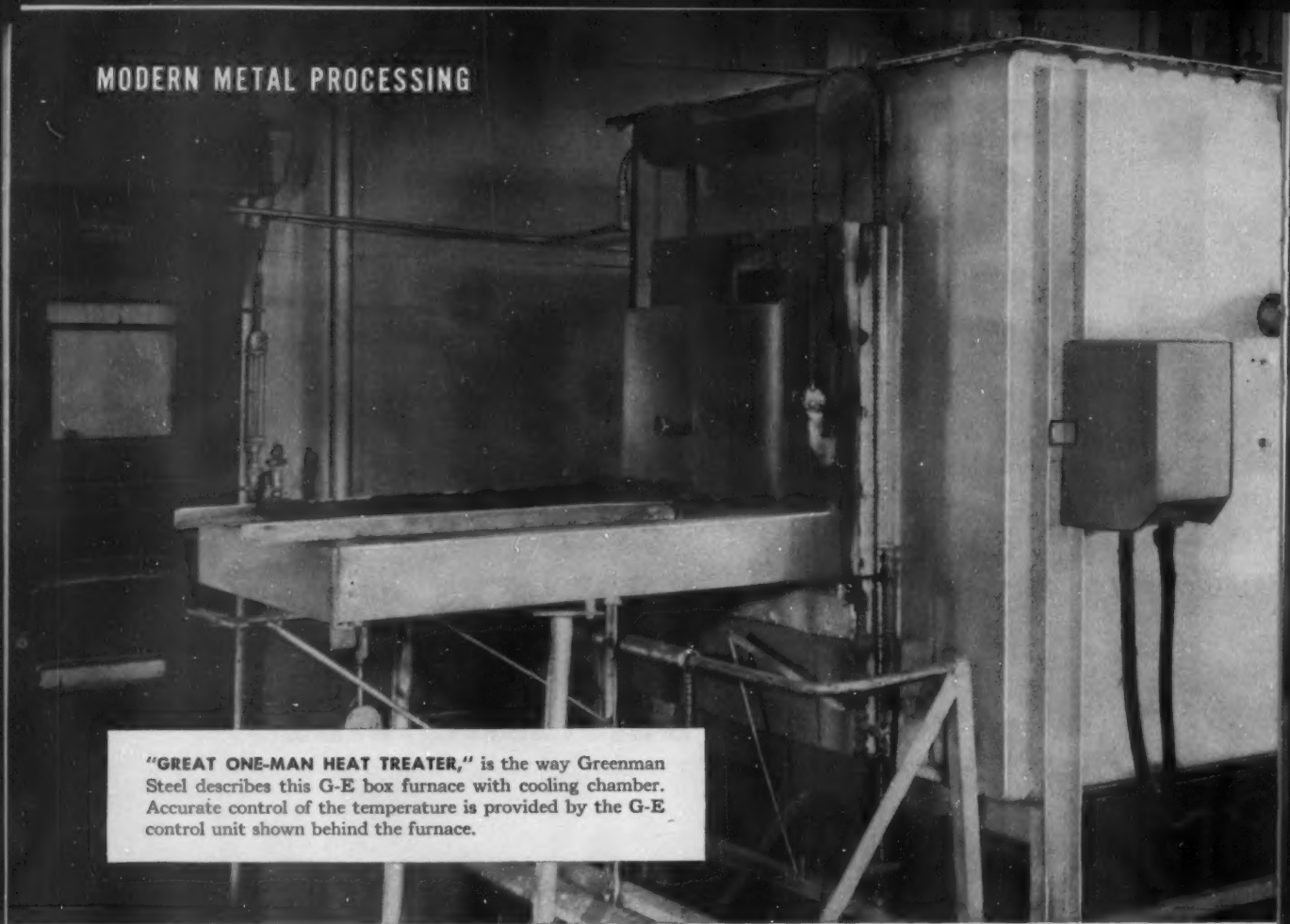
THIS CATALOG may show you how the Simplimatic can save thousands of dollars for you as it is doing for many others. Write for your copy.



Gisholt Machine Co.
Madison 10, Wisconsin
Gentlemen:
Please send my copy of the Simplimatic Catalog.

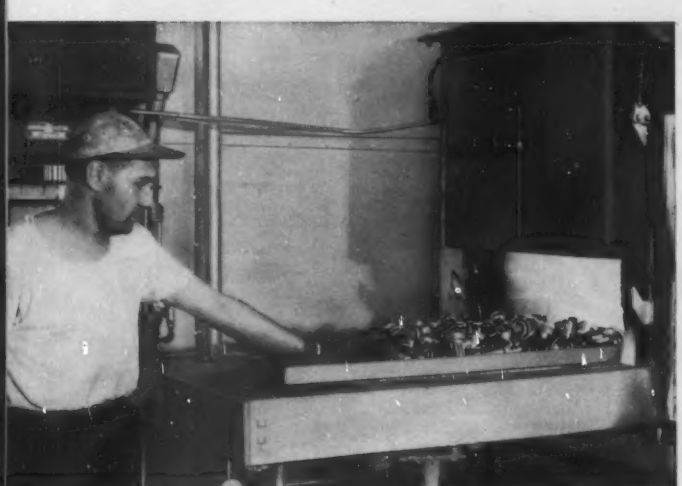
Name.....*Title*.....
Company.....
Address.....
City.....*Zone*....*State*.....

MODERN METAL PROCESSING



"GREAT ONE-MAN HEAT TREATER," is the way Greenman Steel describes this G-E box furnace with cooling chamber. Accurate control of the temperature is provided by the G-E control unit shown behind the furnace.

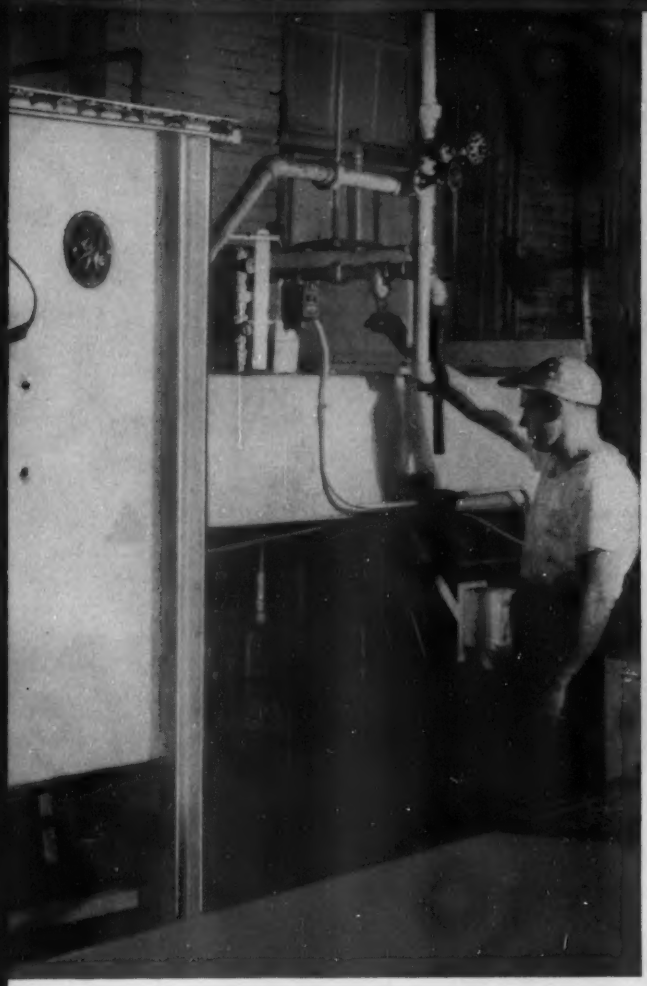
"Versatility of G-E Furnace Almost

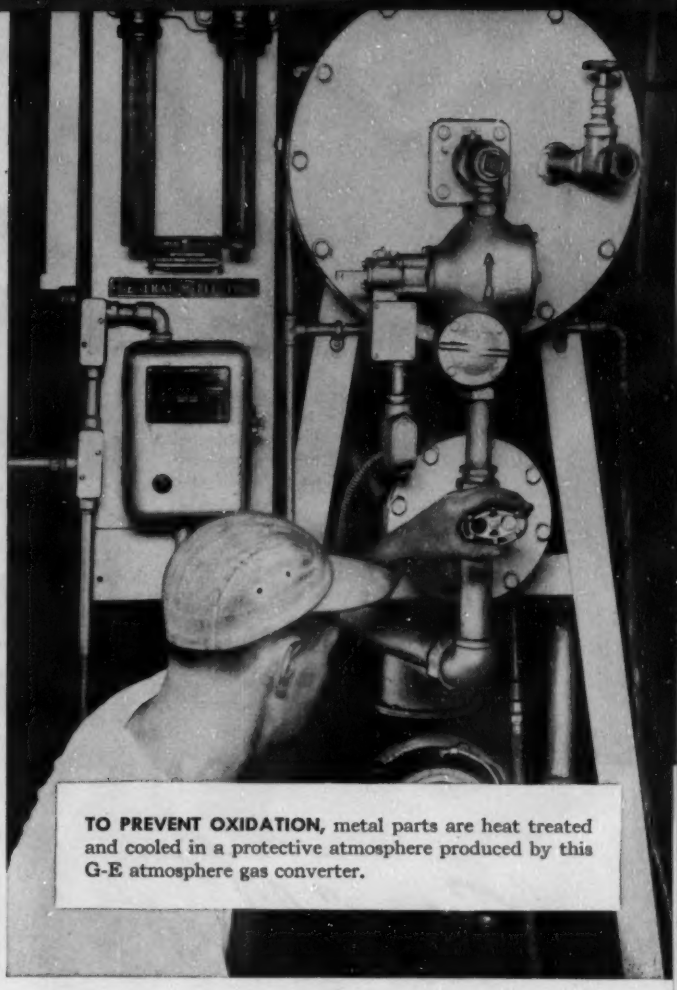


MANY HEAT-TREATING JOBS can be done with this one G-E box furnace. Greenman Steel uses it for copper brazing, silver brazing, annealing, and hardening. Here, the furnace is employed to anneal drawn-steel cups.

HIGH-QUALITY WORK is achieved by moving the parts directly from the furnace to the atmosphere cooling chamber, thereby minimizing oxidation. Here, the parts emerge from the cooling chamber clean and bright.

LOOK FOR IT! G-E's new inert-atmosphere arc melting furnace for melting highly reactive or refractory metal will be demonstrated for the first time at the National Metal Exposition, November 1–5, International Amphitheater, Chicago.





TO PREVENT OXIDATION, metal parts are heat treated and cooled in a protective atmosphere produced by this G-E atmosphere gas converter.

Unlimited," Says Industrial Heat Treater

Operational savings of G-E furnace keep Greenman Steel competitive

Heat-treating jobbers who demand versatility in a furnace find that General Electric's box furnace with water-jacketed cooling chamber is ideal for general-purpose work.

Says Lloyd G. Field, General Manager of Greenman Steel Treating Corp., Worcester, Mass.:

"As a heat-treating jobber, we have to produce high-quality work at lower cost than equipment manufacturers can do it themselves. We must be ready to handle all sorts of heat-treating jobs, yet our investment in equipment must be kept to a minimum. We find that our G-E box furnace satisfies all these requirements. It enables us to stay competitive because it produces superior work at low cost. It minimizes our equipment costs because its versatility is practically unlimited. We use it to copper braze, silver braze, anneal, and harden."

MANY SAVINGS, HIGH-QUALITY WORK

Mr. Field pointed out that operating costs are low because the insulating qualities of the furnace minimize heat loss. Automatic control of the heat assures him of high-quality work.

FOR APPLICATION HELP

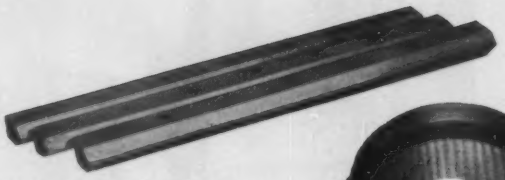
Whether your operation demands a small-capacity, all-purpose furnace, or one that is engineered for a particular process and intended for high-production rates at the lowest possible cost, General Electric can satisfy your requirements. For application help from a G-E Heating Specialist, contact your G-E Apparatus Sales Office.

GENERAL ELECTRIC

WRITE NOW FOR THESE MODERN METAL PROCESSING BULLETINS

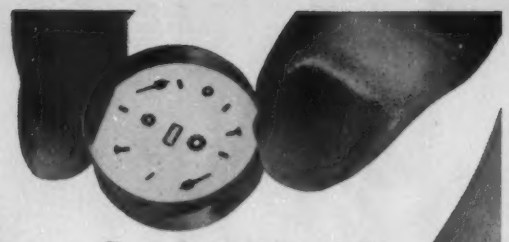
- Furnace and Induction Brazing, GEA-5889
- Annealing Malleable Iron, GEA-5797
- Forging with Induction Heat, GEA-5983
- Heat-treating Aluminum, GEA-5912

Address: General Electric Co., Section 720-129, Schenectady 5, N. Y.



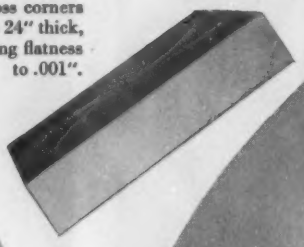
Hardened steel machine tool ways, 2½" x 3½" x 50", ground on 6 sides, flat within .001" with surface finish of 5 micro-inches—*5 times faster than other methods!*

To 3 micro-inches and flat within *one* light band.

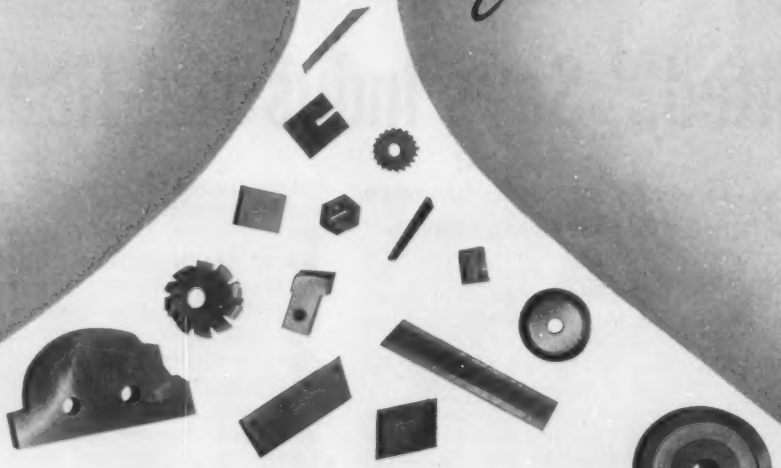


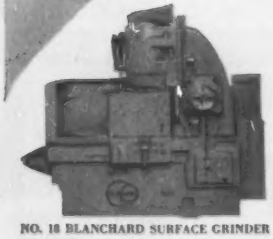
Tiny watch gears, pinions and ruby bearings—flat and parallel—to a dimension tolerance of .0002".

Die plates, 84" across corners and perhaps 24" thick, holding flatness to .001".



"Specs" like these call for Blanchard





NO. 10 BLANCHARD SURFACE GRINDER

Every day, parts like these are ground accurately and rapidly on Blanchard Surface Grinders equipped with Blanchard Abrasive Wheels. They're ground economically too—at costs which help you set competitive prices.

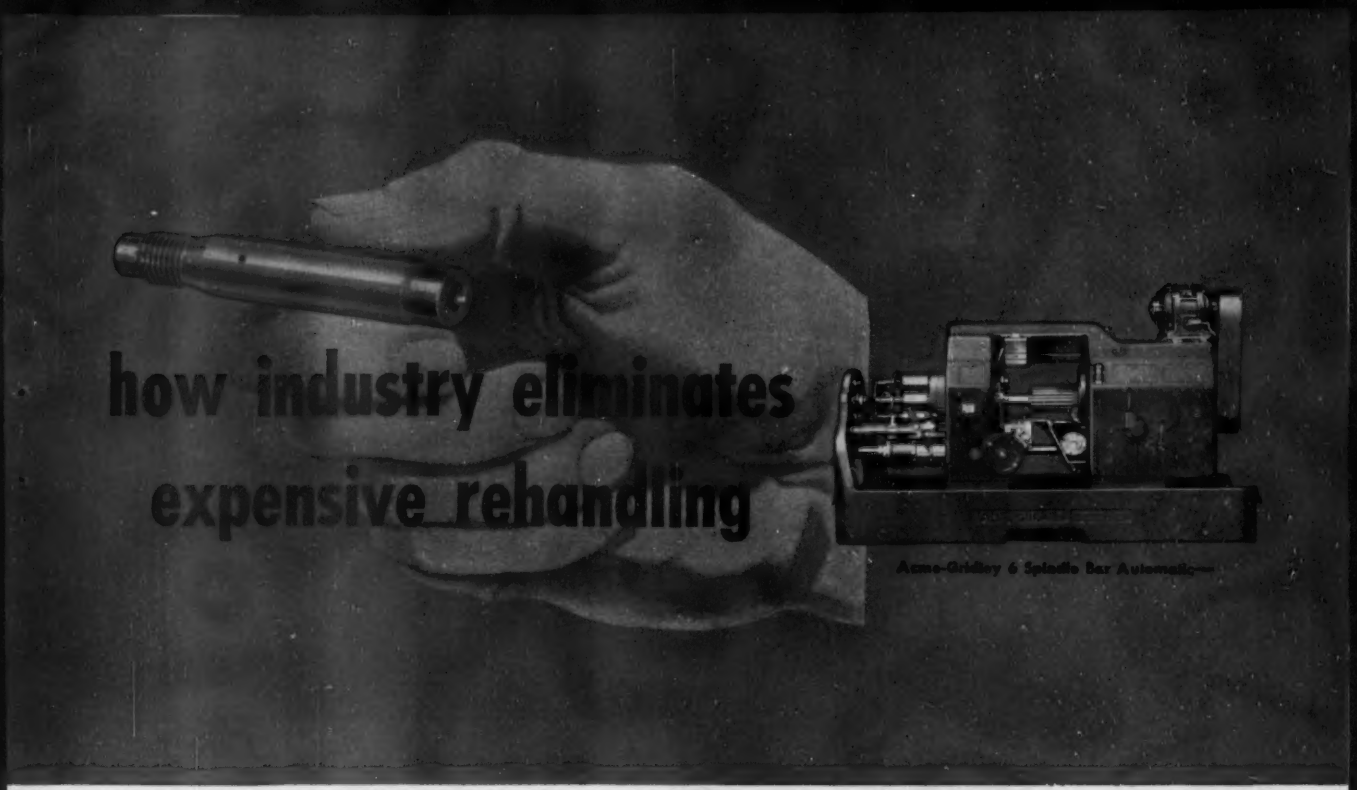
Send a sample of your parts for free test grinding and recommendations.

Send for your free copies of "Work Done on the Blanchard", fourth edition, and "The Art of Blanchard Surface Grinding".

PUT IT ON THE BLANCHARD

THE BLANCHARD MACHINE COMPANY

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.



Acme-Gridley 6 Spindle Bar Automatic—

with ACME-GRIDLEY Bar Automatics

Whether you "automate" or pick 'em up with your fingers, you're going to have a certain amount of handling in making any product. But, the less *re*handling—the faster the job is done and the lower the cost per piece.

That is why more and more manufacturers are getting more operations on their primary machining equipment. It's also why, every day, more intricate parts like these—and larger ones, too—are being *completed in one setup* on multiple spindle Acme-Gridley bar machines.

Ingenious tooling of these versatile machines with standard National Acme toolholders and attachments often eliminates second operation work entirely—saves not only handling, but also extra machines, floor space and valuable man-hours. And in addition, the parts are more accurate because you don't have to re-chuck.

Check your machining methods today—then ask your engineers and ours to talk it over.

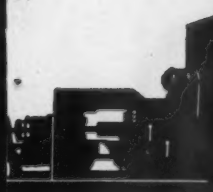
Remember—the biggest help to your competition is your continued use of obsolete equipment.

ON JOBS LIKE THESE

DRILLED STUD 3/8" diameter, 2 1/4" long.
MATERIAL: B-1113 CD Steel.
OPERATIONS: 12 including rolled thread and spindle stopper for cross drilling to blind hole.
MACHINE TIME: 9 seconds (400 completed pieces per hour.)
(Formerly done in two setups)

WORM 3/8" diameter, 1 3/4" long.
MATERIAL: B-1113 CD Steel.
OPERATIONS: 9 including machining the worm and broaching end of piece.
MACHINE TIME: 8 seconds (450 per hour.)
(Formerly done in three setups)

Ask for Catalog M-450

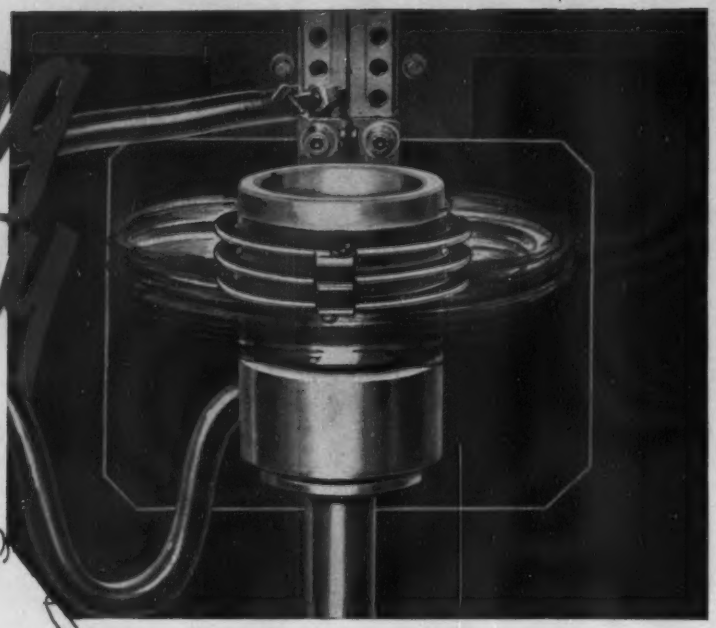


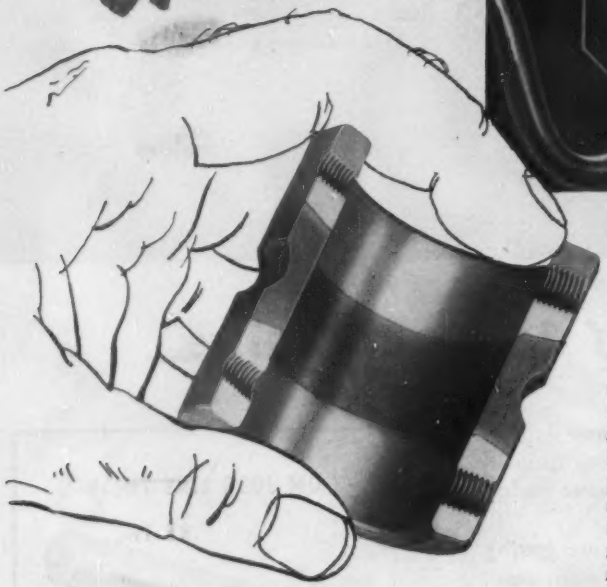
The NATIONAL
ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • Limit, Motor Starter and Control Station Switches • Solenoids • Contract Manufacturing.

Blazing the wa





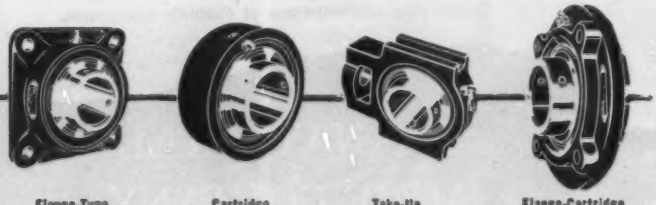
to greater bearing performance!

Here's another SEALMASTER patented exclusive in action! *Zone Hardening* is another in a long history of advances that includes: the *first* self-aligning, permanently-sealed industrial ball-bearing unit . . . the *first* outer-race locking pin . . . the *first* ball retainer riding the inner surface of the outer-race ring . . . all patented features! *Zone Hardening* is a completely automatic heat treating process by which the inner-race ring of SEALMASTER Ball Bearing Units are hardened through the ball path and adjacent section only. The extended portion of the inner-race is left in its original metallurgically soft, tough state. Hardened set-screws are mounted through this soft portion of the race, permitting race-to-shaft locking with increased holding power and greater resistance to vibration and shock. Firm lock of bearing to shaft minimizes danger of fretting corrosion and eliminates shaft wear.

This new feature is available on all SEALMASTER Bearing Units which includes a complete line of standard housings, as well as, numerous special designs.

For your copy of Catalog 454 call your SEALMASTER Distributor or write the factory:

SEALMASTER
BALL BEARING UNITS



Flange-Type Unit | Cartridge Unit | Take-Up Unit | Flange-Cartridge Unit

SEALMASTER BEARINGS A DIVISION OF STEPHENS-ADAMSON MFG. CO.
16 RIDGEWAY AVENUE, AURORA, ILL.

Do YOU Know What WE Know About Speeds and Feeds?

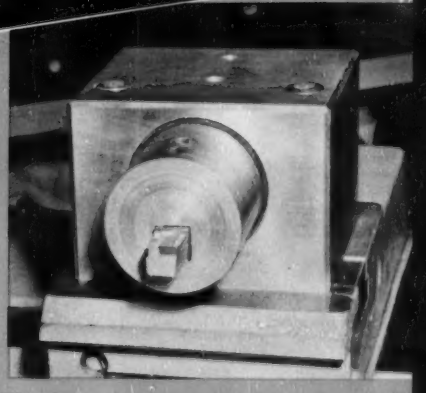
Let us tell you! *This new Monarch Speeds and Feeds Booklet will better your production.* It's full of basic material and data on all commonly turned materials —invaluable information for production men and lathe operators; for engineers, foremen and methods departments.

This new report from the continuing Monarch machinability research program is a valuable tool that you'll want to put in the appropriate hands in your organization without delay. A copy is yours, without cost, as a Monarch service.

Monarch
ACCURACY • ECONOMY • LONG LIFE
TURNING MACHINES

FOR A GOOD TURN FASTER . . . TURN TO MONARCH

See Next Page For Details

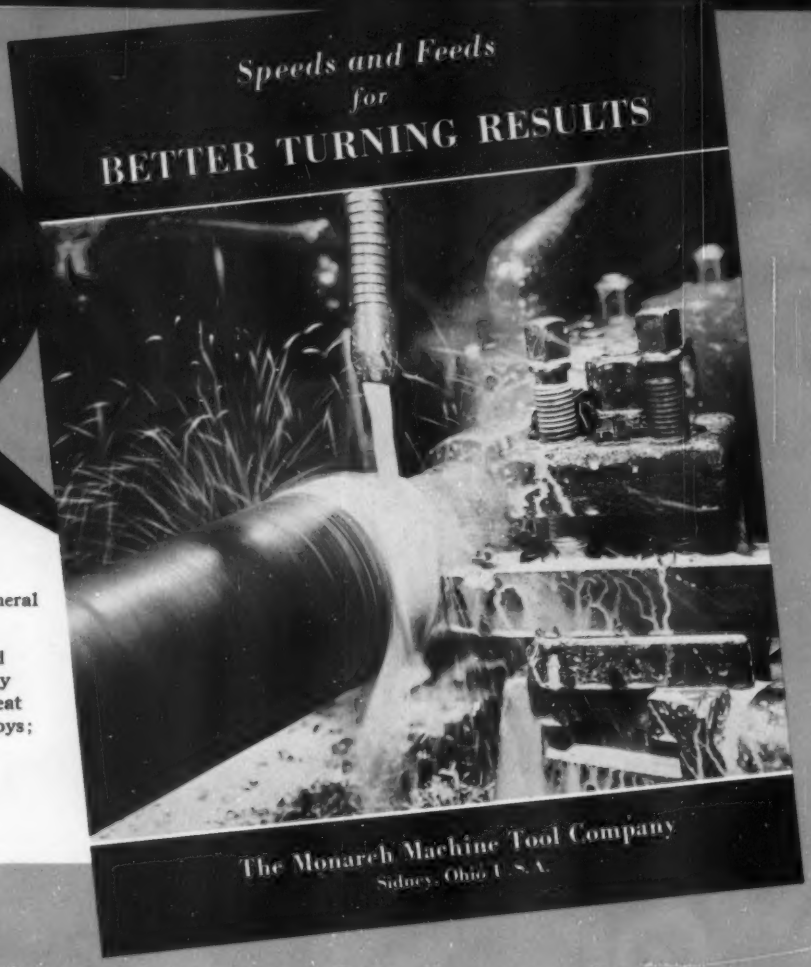


▲ Close-up of Dynamometer Used in Monarch Tests.

◀ Monarch Machinability Test Lathe in Action, With Typical Instrumentation.

The last word in turning—

Fresh off the Press!



PARTIAL LIST OF CONTENTS

SUBJECTS—Tool Angles; Machinability Ratings; Speed and Feed Charts; General Practice; Coolant; Horsepower.

MATERIALS—These subjects are discussed as pertinent to: Plain and Carbon Alloy Steels; Tool Steels; Stainless Steels; Heat Resistant Alloys; Cast Iron; Nickel Alloys; Copper Alloys; Aluminum Alloys; Magnesium Alloys; Plastics.

TECHNICAL CUTTING DATA—TABLES

WHAT IT IS. This book tells *you* what our studies tell us about the basic facts of turning. No complete technical operations handbook, its primary purpose is to serve as your guide in establishing optimum machining conditions. Much of this information is original and available nowhere else. What information has been distilled from other sources has been re-evaluated from our own findings under down-to-earth shop conditions.

ITS SOURCE. The Continuing Monarch Machinability Research Program.

This project has been in operation for some years, under the supervision of full-time recognized specialists drawing on all Monarch facilities (see preceding page). Its scope consists of the continuing evaluation of *all machining factors* which have a bearing on getting the maximum practical output from carbide cutting tools.

ITS PURPOSE. With its facts, this booklet will guide you to better, more profitable turning practice, regardless of your equipment. Or, with Monarch lathes featuring single point turning and tracer controls, you'll get *from* your lathe all the productivity we build *into* it—and that's optimum productivity . . . *The Monarch Machine Tool Company, Sidney, Ohio.*

To Get Your Free Copy **of the Monarch *Speeds and Feeds* Booklet, FILL OUT THIS COUPON and attach it to your business letterhead.**

THE MONARCH MACHINE TOOL COMPANY, Sidney, Ohio

Gentlemen: I would like a copy of your Speeds and Feeds Booklet. Please send it to me without obligation.

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COMPANY _____

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TURNING MACHINES
ACCURACY • ECONOMY • LONG LIFE
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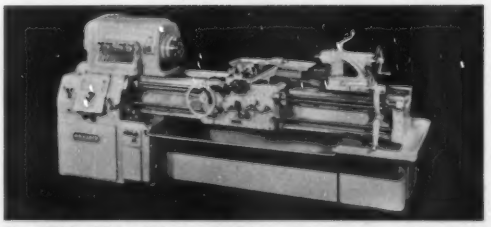


See This New Monarch Line—Series 61. First and only complete lathe line with apron-controlled 4-way power rapid traverse.

Looking for versatility?

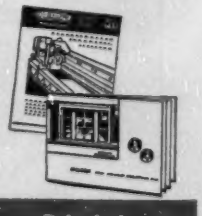
Illustration shows closeups of machine milling 36-gauge rack in textile machine needle beds with a gang of 58 cutters.

This production machine mills racks of varying pitches, widths and lengths

Here is another example of how the Special Machinery Division of Kearney & Trecker helps solve specific production problems. This rack milling machine was designed and produced for a textile machinery manufacturer who required a highly versatile machine that could mill racks up to 14′ long with widely varying characteristics. The table has a working surface of 18″ x 19′, and the entire traveling head and knee assembly is rigidly supported on three hardened and ground steel ways.

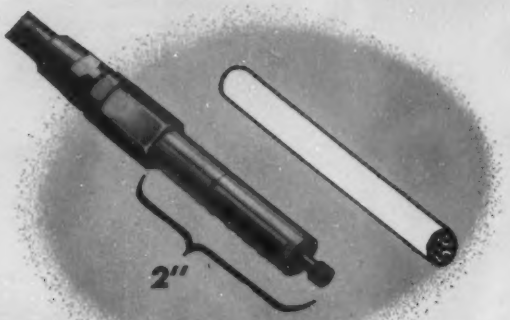
Positioning can be accomplished manually or by power. A shot bolt, which engages in bored holes along one side of the indexing fixture, assures final positive positioning.

If you'd like to know how Kearney & Trecker special machinery can give you the exact tool you require, contact your representative or write for the booklet "Doorway to a proven method for solving big or small metal-working problems." For details on this particular machine, ask for Data Sheet No. 1011. Kearney & Trecker Corp., 6784 West National Avenue, Milwaukee 14, Wisconsin.



KEARNEY & TRECKER CORP. · *Special Machinery Division*
MILWAUKEE 14, WIS., U. S. A.

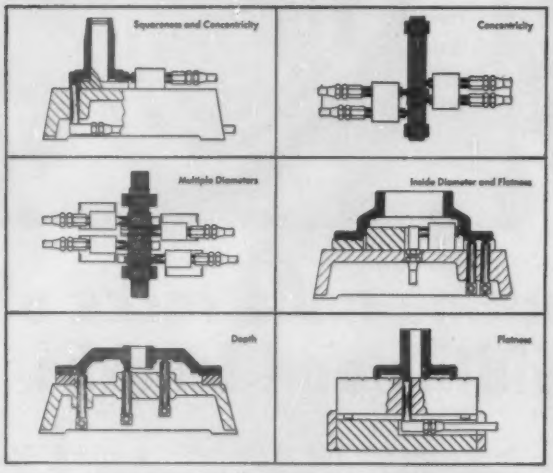
FEDERAL



AIRPROBE is smaller than a regular cigarette!

You Don't Need Any Masters to Calibrate the AIRPROBE

Some Jobs require Federal Special-Design Gages. Here's how the AIRPROBE is applied:



Federal's Model 165 Hole Gage equipped with a Federal AirProbe. Gage makes mechanical contact with the hole diameter.

4 EXCEPTIONAL FEATURES:

1 self-zeroing

No tolerance setting masters required — simply set the AirProbe to zero on the Dimensionair scale and adjust in the gage as you would a Dial Indicator.

2 accurately calibrated

All readings on the dial are actual calibrated readings — not arbitrary values divided between minimum and maximum limits as with other air gages.

3 longer measuring range

A much longer range per magnification than that of other similar gage heads. Available ranges, with different dials, are .003", .006", .015", and .030".

4 longer approach range and overtravel.

With an approach travel of .031", a spindle travel of .140", and an overtravel of from .070" to .100", there's plenty of surplus for easy setting and measuring.

AIRPROBE !

Apply it directly to Federal Catalog Gages — No need to design Special Gages!!

The Federal AIRPROBE now makes it possible to gage by air a great variety of dimensions of almost any type, under almost any condition, when circumstances indicate that air can do the job best. It's a universal gage-head — a small, spindle-like device — which can be used in practically the same manner as a Dial Indicator on gaging fixtures, otherwise inaccessible locations, and on machine dimension control applications. Dimensional variations are read directly on the precisely calibrated dial of the Federal Dimensionair just as they are on a Dial Indicator.

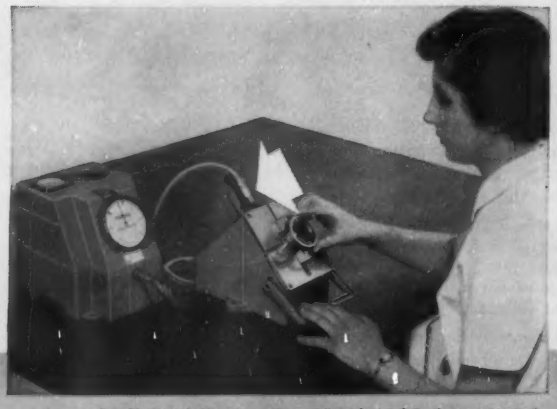
Any production supervisor, engineer, or inspector, realizes that top efficiency lies in careful selection of the gage best suited to the requirements. Gaging with the DIMENSIONAIR AIRPROBE often offers certain advantages and enables him to meet his requirements with a greater degree of precision.

Federal offers practically all systems of gaging — air, dial indicators, electrical, and electronic. We design and make all these gages and can advise you *without bias* as to what system is best suited to your requirements. Ask our engineers for their recommendations. Federal Products Corporation, 41210 Eddy Street, Providence 1, R. I.

Ask **FEDERAL**

FOR ANYTHING IN MODERN GAGES...

DIAL INDICATING, AIR, ELECTRIC OR ELECTRONIC — FOR INSPECTING, MEASURING, SORTING OR MACHINE SIZE CONTROL



A regular Federal Catalog Gage, Model 36 B-6 Bench Hole Gage, equipped with a Federal AirProbe and Dimensionair. Don't waste time designing special gages to use air when Federal already has *Catalog Gages* of proved designs.

The well known Federal NB-60 is shown here with a Federal AirProbe and Dimensionair. Another illustration of the economy of using Federal "already designed and built" gages with air.

New lightweight grinder is a HEAVYWEIGHT WORKER!

Why weigh down an operator with a heavier grinder? Put a new 7 pound air-powered CP Vertical Grinder in his hands and he'll remove the same amount of metal as he formerly did with a 10 pound tool!

Designed for driving cup wire brushes and grinding wheels, sanding discs, and cut-off wheels, the CP-3190 is tops for its handling ease and versatility. The features below explain why the CP-3190 takes the constant beating of heavy industrial usage with minimum maintenance:

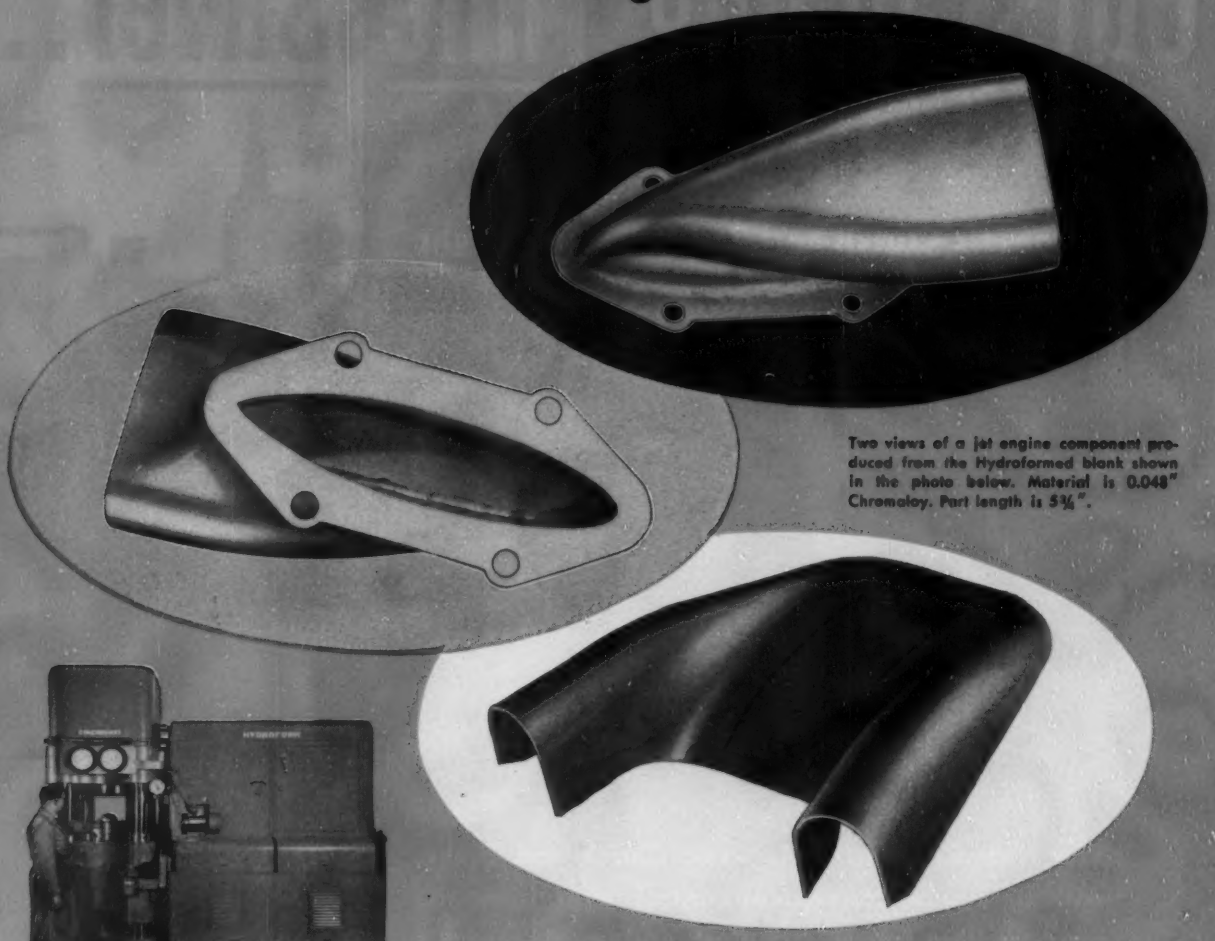
- **Splined type floating rotor to prevent end-plate wear from wheel thrust.**
- **Continuous lubrication is afforded by large oil reservoir and built-in lubricator.**
- **Safety governor valve cuts off air supply in the event of possible governor failure.**

Available in speeds up to 8000 RPM and in capacities capable of handling 6" cup wheels, and 7" and 9" disc sanding pads and cut-off wheels. For more information write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

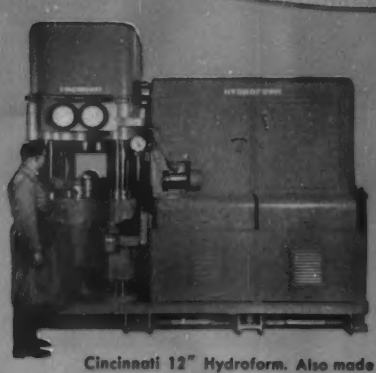
Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

the answer to this tough one . . .



Two views of a jet engine component produced from the Hydroformed blank shown in the photo below. Material is 0.048" Chromaloy. Part length is 5¾".



Cincinnati 12" Hydroform. Also made in 8", 19", 23", 26", and 32" sizes.

was Hydroforming

The manufacturer who contracted to supply this jet engine component certainly got the job off to a good start. It was well planned throughout. The finished shape was to be obtained by drawing a blank of 0.048" Chromaloy to the required contours so that by cutting the part lengthwise, a right-hand and left-hand section would be produced. The sections, plus a stamped flange, were to be assembled by welding.

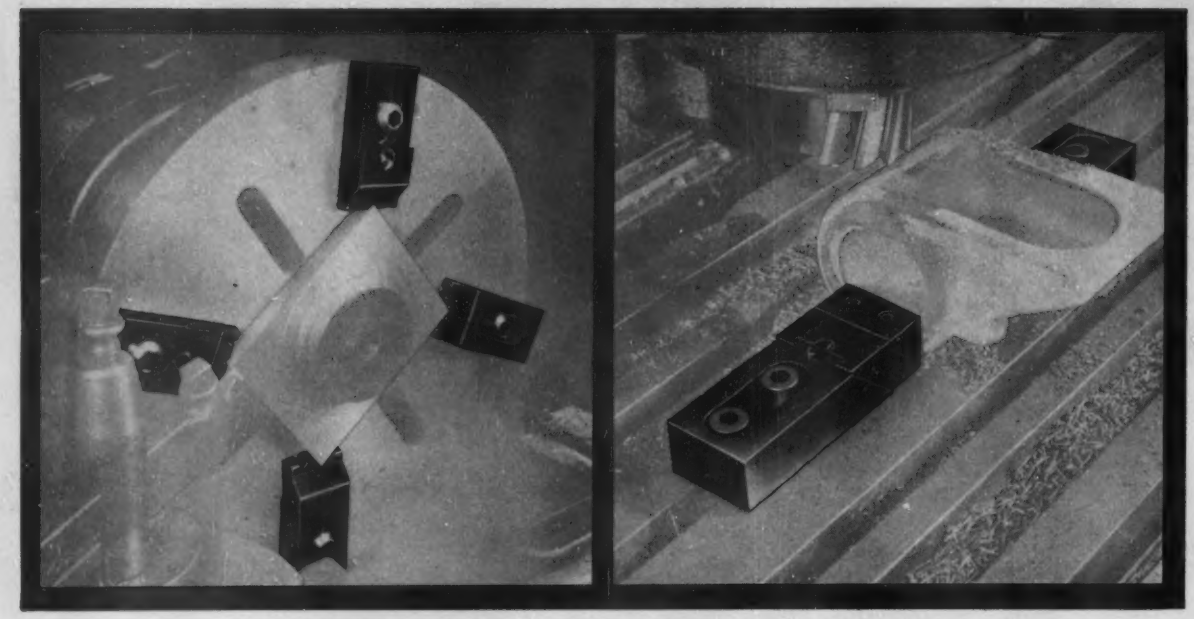
The shape of the punch was accurately developed and draw press tools were made. Then the trouble started. The available equipment would not form a satisfactory part. And time was getting short.

So the manufacturer shipped the punch and material to the nearest Cincinnati 12" Hydroform. The blanks were quickly drawn to shape—and the jet engine builder received the required number of parts on time.

Manufacturers who have invested in Hydroforming have been rapidly repaid in shortened part development time, in greatly reduced tool expense, in the elimination of operations, in part quality improvement. Let a Cincinnati Milling field engineer give you complete details. For a description of the Hydroforming process and specifications of the six machine sizes, write for Bulletin M-1759-3.

CINCINNATI **Hydroform**

PROCESS MACHINERY DIVISION
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO, U. S. A.



J & S "ALL-PURPOSE" JAW CLAMPS CAN BE USED ON ALL STANDARD TYPES OF MILLING MACHINES, LATHES, PLANERS, BORING MILLERS, DRILL PRESSES, AND OTHER MACHINE TOOLS

How to secure workpieces with ease, cut handling time up to 75%

J & S "All-Purpose" Jaw Clamps give you many unusual advantages in securing workpieces to machine tools—save as much as 75% of the time required with outdated methods.

Downholding Principle

J & S' *downholding* principle makes this possible. Here's how it works: When you turn the adjusting screw of the clamp, the jaw travels straight *in* and *down*. This forces the workpiece horizontally against the opposite clamp and downward against the face plate or table. In this way, centering is quick, simple. The tapered slot prevents the clamp from slipping regardless of the load.

Need no U-clamps or straps

With J & S "All-Purpose" Jaw Clamps, you can avoid the use of U-clamps and straps, disregard different length studs and blocking. You can also minimize obstructions in set-ups, reduce cut-off waste. You can pass over J & S Jaw Clamps 1" from the working surface of the machine face. The whole surface of the workpiece can be machined to within 3/8" of the face plate or table.

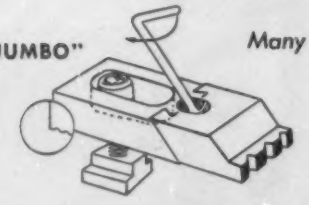
You can get J & S "All-Purpose" Jaw Clamps in a variety of sizes. Write for complete information today.

J & S "JUMBO" and "LI'L GIANT" JAW CLAMPS

For large planers

Many times more powerful than finger set-ups

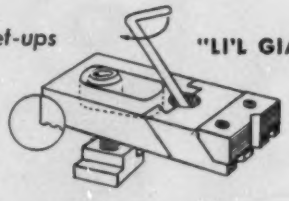
"JUMBO"



FORM RELIEVED

COMPLETELY HARDENED

"LI'L GIANT"



Both clamps have T-nuts which fit all large standard planers. 45° oblique travel of jaw secures workpiece against table and against counterthrust of opposite clamp. 1/16" back taper (dotted line) and relieved ground surface (magnified detail) prevent slippage.

J&S TOOL CO., INC.

WHEEL DRESSERS • JAW CLAMPS • PRECISION VISES • SINE BARS DOWN-HOLDING DEVICES

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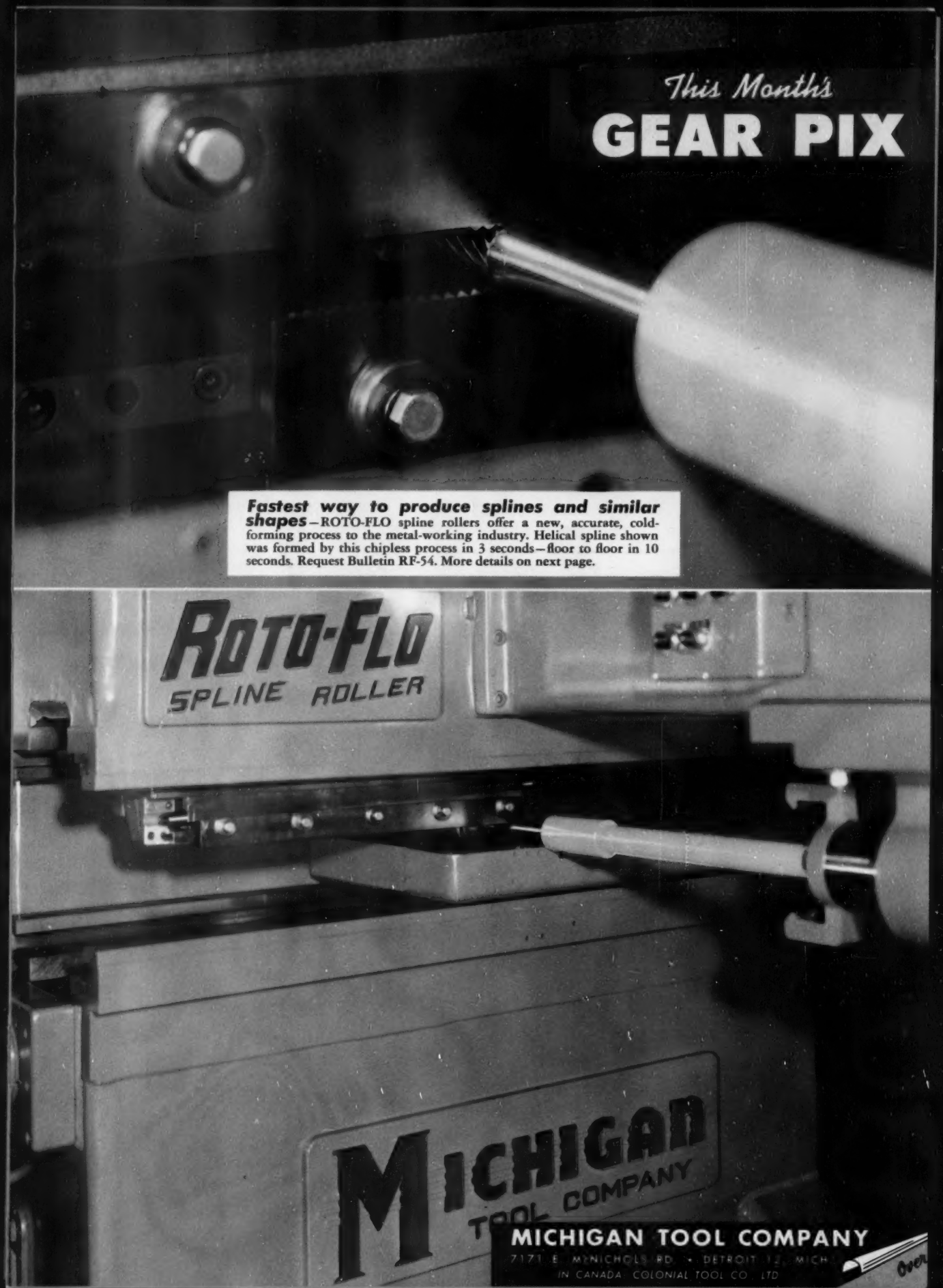
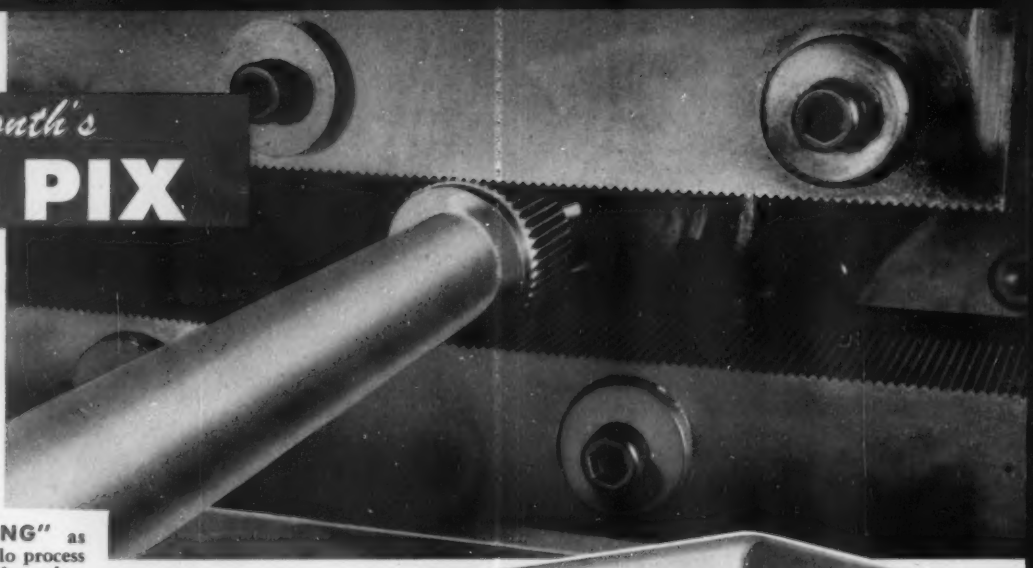
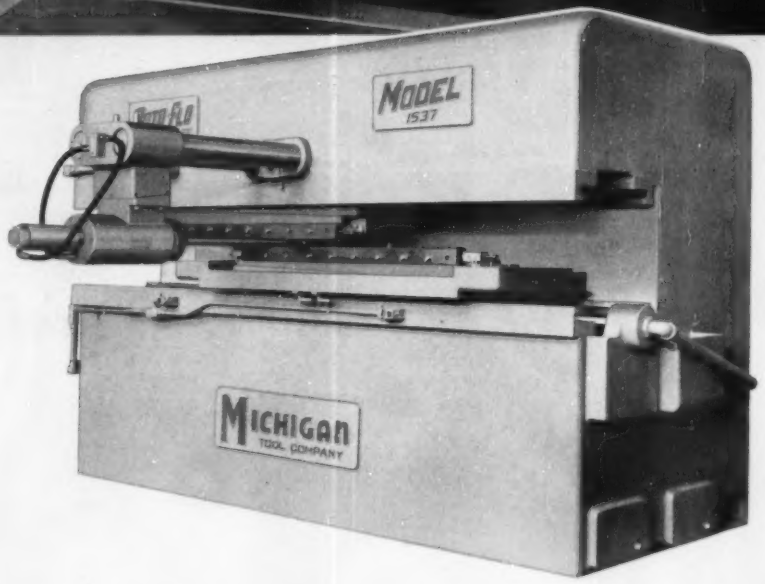

This Month's
GEAR PIX
Fastest way to produce splines and similar shapes—ROTO-FLO spline rollers offer a new, accurate, cold-forming process to the metal-working industry. Helical spline shown was formed by this chipless process in 3 seconds—floor to floor in 10 seconds. Request Bulletin RF-54. More details on next page.
ROTO-FLO
SPLINE ROLLER
MICHIGAN
TOOL COMPANY
MICHIGAN TOOL COMPANY
7171 E. McNICHOLS RD. • DETROIT 12, MICH.
IN CANADA: COLONIAL TOOL CO., LTD.
Over

This Month's

GEAR PIX



"CHIPLESS MACHINING" as accomplished by the Roto-Flo process —a straight spline is being formed as it is rolled between the two forming racks. Roto-Flo produced parts have excellent surface finishes and are formed to close dimensional tolerances.



ONE of the standard models offered in the *Roto-Flo line is the 1537 with a capacity for rolling parts up to 2 inches in diameter. The stroke on these machines is variable, depending upon the size of the forming rack required for the part being produced.

SPLINES and other "tooth" forms, can be formed in a very few seconds by the Roto-Flo process, at a marked reduction in cost. As illustrated, this latest development by Michigan Tool Company in "chipless machining" presents designers with a new range of flexibility when specifying splines, serrations, and other similar shapes on external parts.

*Patent Pending

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS RD. • DETROIT 12, MICH.

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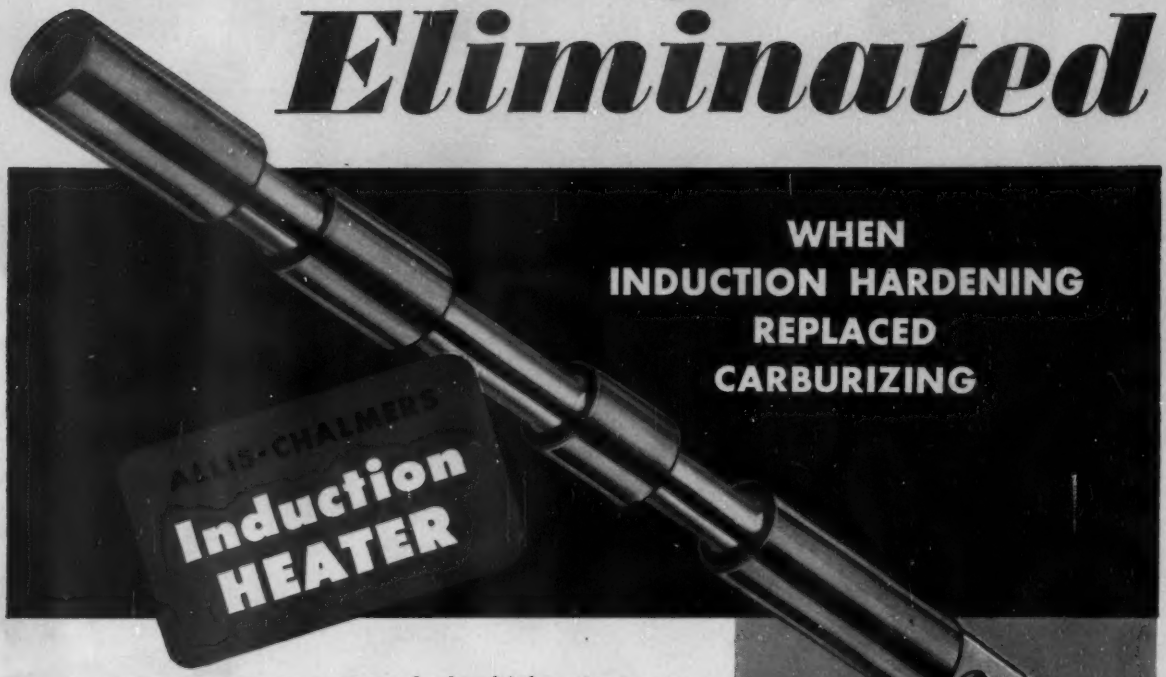
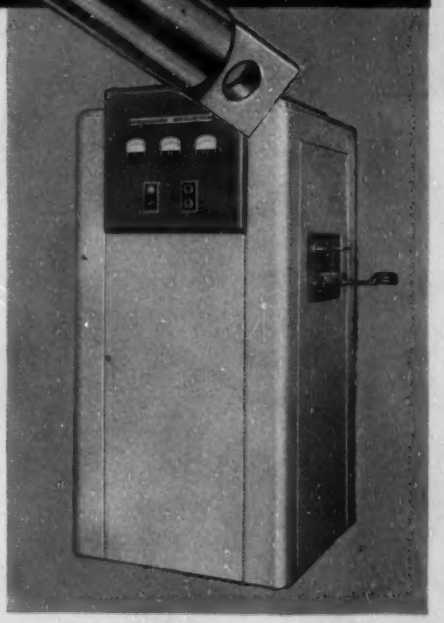
Rejects Eliminated



WHEN INDUCTION HARDENING REPLACED CARBURIZING

A LEADING AIRCRAFT BUILDER had a high reject rate while carburizing hydraulic control valves. In addition, production was slow. Rework after rework was necessary because material was brittle and straightening was difficult, if not impossible. Depth of carburization was also hard to control . . . and it was a dirty job, too!



Picture Changed Overnight

Now, with Allis-Chalmers induction heaters rejects or reworks are eliminated; depth of hardening is held between .078 inches and .080 inches; production is greatly increased; and it's a clean, pushbutton type job.

Where there's a problem with warpage, scaling, or heat control, even a relatively low production item can often be profitably processed using induction heat.

Bring your problems to Allis-Chalmers. Call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

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Allis-Chalmers
Milwaukee 1, Wisconsin

Please send information on ☐ brazing ☐ hardening ☐ annealing

Name..... Title..... Company.....

Street..... City..... State.....

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MACHINE & TOOL WORKS
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..a great, new line of inclinable presses

FEATURING
the exclusive Niagara Electro-Pneumatic Clutch

- Combines prime advantages of friction and mechanical sleeve clutches.
- Has no friction surfaces to slip, heat or wear.
- Provides a positive drive that engages or disengages instantly, at any point in stroke.
- Can be single-stroked, jogged or run continuously.
- Operates effortlessly by palm buttons or foot switch.
- Stops automatically if power or air pressure fails — an important safety feature.

Never before in O. B. I. Press history, has there been so significant a development as this new Niagara line . . . Series AA. Built in eight sizes, with shaft diameters from 3 to 7½ inches, it has set a new high for performance and stamina in blanking, forming, drawing, perforating, combination die and automatic feeding operations.

Get the complete story. Send for literature. Talk with our representative. SEE the press in action. Compare! Then, decide.

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...and REX is the standard by which all high speed steels are compared

No matter how keen the competition, there can be only one winner. And the difference between the winner and the runner-up, whether it's golf or making high speed steels, is measured in performance.

Crucible REX® high speed steels have proved their championship qualities under the toughest sort of competition — in actual use in thousands of tool shops throughout the world. But check for yourself. Try a piece of REX high speed steel on your next job. Compare its hardenability, response to heat treatment, its fine tool performance. You won't find another high speed steel to outperform REX.

Ask for REX by name wherever high speed steels are sold. But remember, REX is made *only* by Crucible.

CRUCIBLE first name in special purpose steels

54 years of Fine steelmaking **TOOL STEELS**

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Cincinnati Grinding Wheels offer

PD POSITIVE DUPLICATION

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"On grade" with a CINCINNATI (PD) WHEEL means all future (PD) WHEELS will act and grind *exactly alike.* Yet they *are priced no higher than ordinary wheels.*

Let us prove to you how CINCINNATI (PD) WHEELS will make money for you. Just contact us and we'll send one of our representatives—men who know grinding and grinding machines as well as grinding wheels. Write, wire or 'phone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati, 9, Ohio.

CLEEREMAN

DRILLING MACHINES

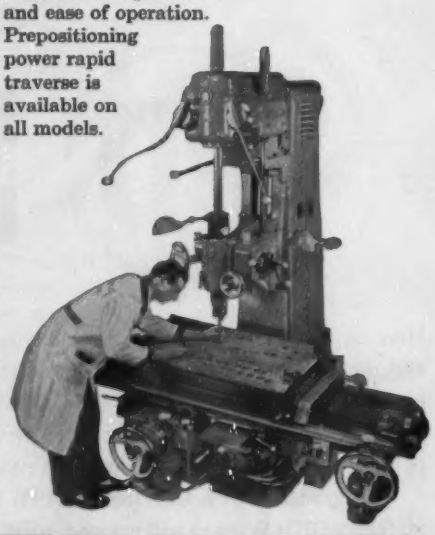
A battery of box column and round column Cleereman Drilling Machines on production work. One of many such installations producing at lower costs with higher production, less operator fatigue and no down time.

LAYOUT DRILLING MACHINE

A modern solution to an old problem. Built for those tool room and manufacturing jobs which do not require the ultra precision of Cleereman Jig Borers. The Cleereman Layout Machine is an economical machine capable of locating within .001" per foot and drilling, boring, reaming, tapping, etc., with utmost operator ease at a fast rate of production.

JIG BORER

Unexcelled precision for ultra-fine tolerances on highest quality gage, tool, die, jig and fixture work and on "jigless" production. Combines stamina with precision and ease of operation. Prepositioning power rapid traverse is available on all models.



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BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

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balanced for your particular operations

● What is your operation? Gear shaping, high speed automatics? No matter . . . because Stuart Oil Company has balanced cutting oils for you . . . with just the right amount of lubricity, temperature control and chemical activity to provide you with the optimum in finish, production and tool life.

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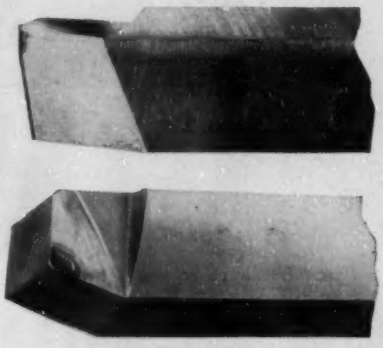

The cutting tool at top shows an abnormal front clearance caused by excessive chemical activity of cutting fluid. The lower cutting tool shows cratering, usually associated with poor finish, resulting from insufficient chemical activity of cutting fluid used.

More than a "Coolant" is Needed

D.A. Stuart Oil Co.
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☐ Please send a Stuart's Cutting and Grinding Fluid Selector and Dilut-O-Graph Folder.

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Capacity up to 8" round

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Better Machines-Better Blades

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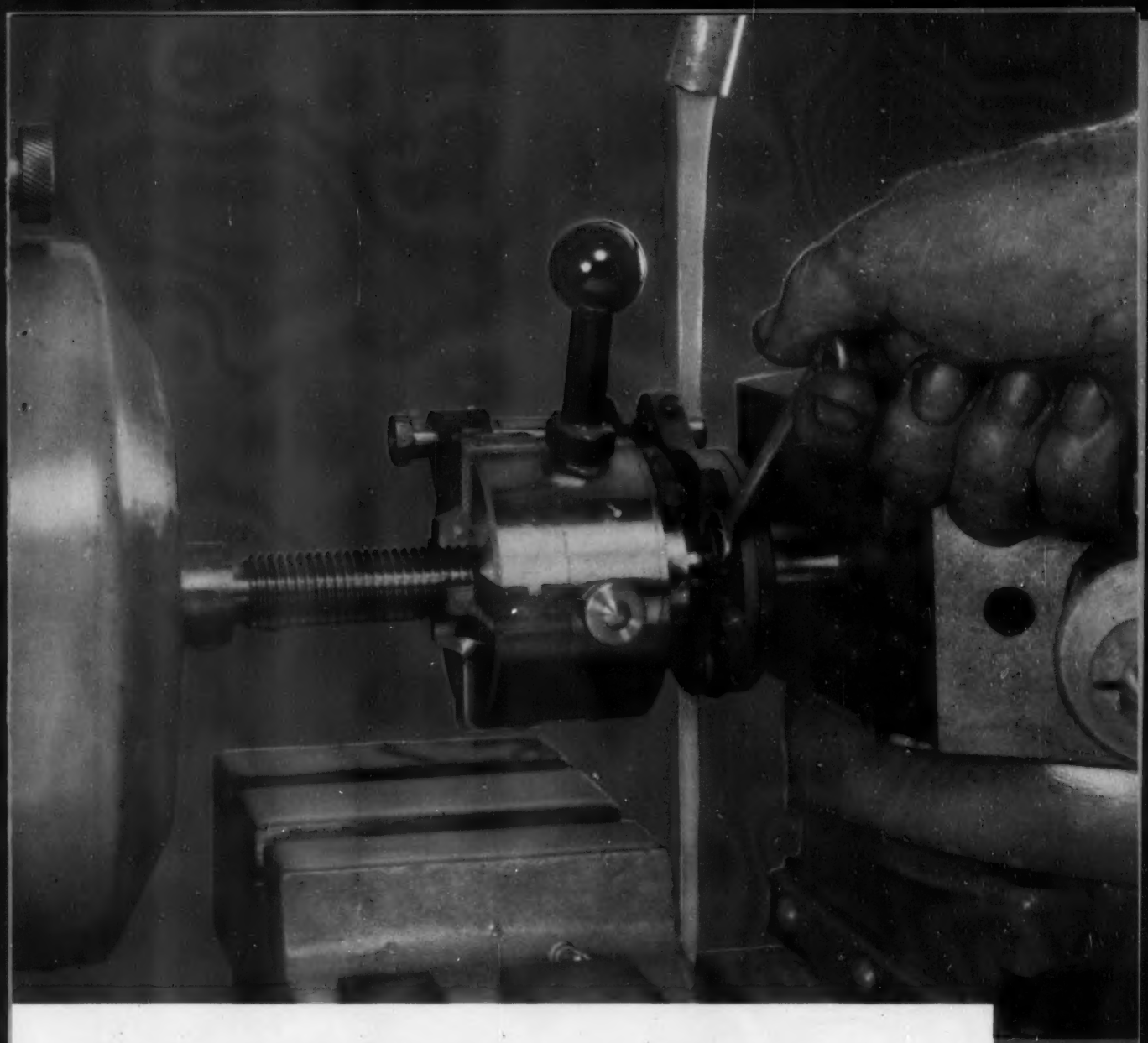


MISALIGNMENT EASILY CORRECTED

Misalignment is a serious matter in threading and should be rectified as soon as possible. With the GEOMETRIC DS Head, however, uninterrupted production may be maintained on slightly misaligned jobs until permanent adjustment can be conveniently made.

By loosening two "back screws" on the ALIGNING SHANK, the head is allowed to float. A true-running work blank may then be threaded and the head, thus aligned, retightened with the "back screws."

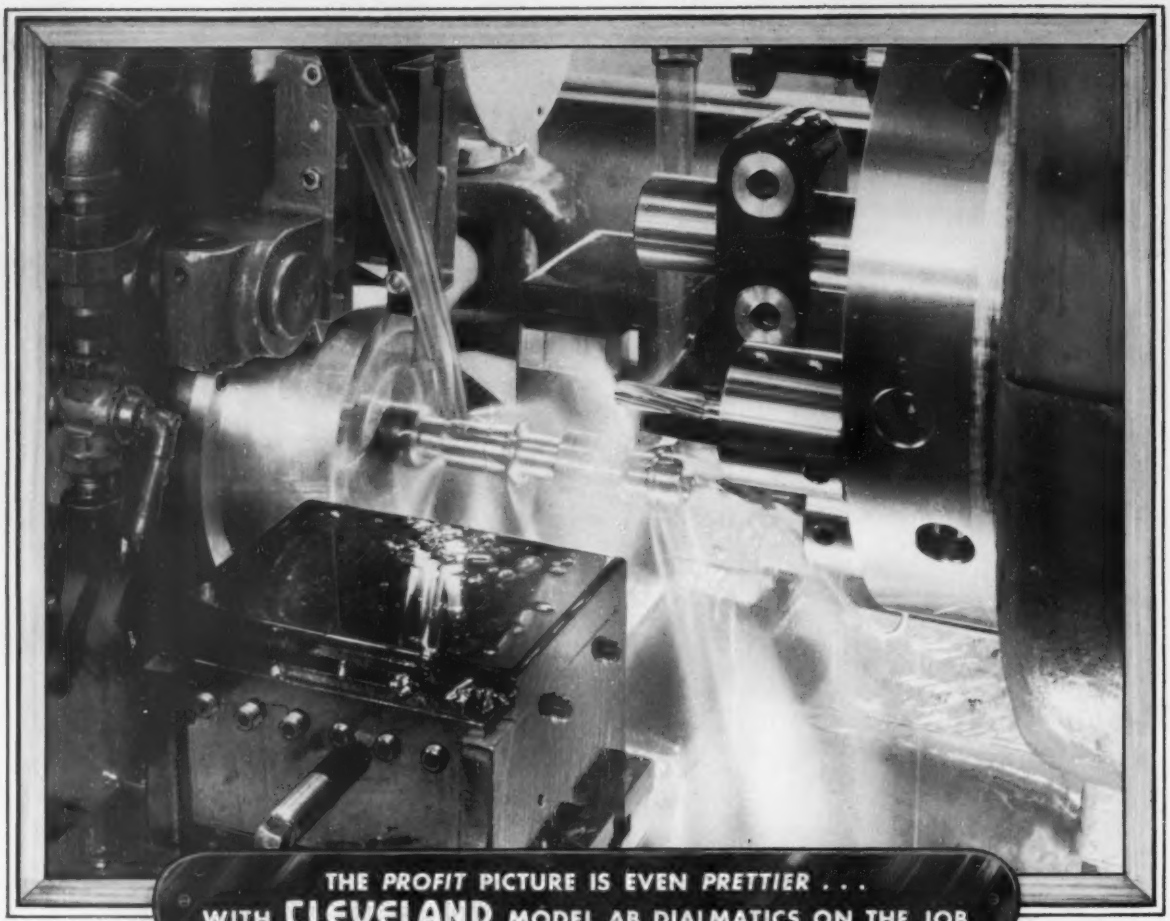
Write for full details. Specify Bulletin DS

Greenfield Tap and Die Corporation

GEOMETRIC TOOL COMPANY DIVISION

NEW HAVEN 15, CONNECTICUT

GEO MET RIC



THE *PROFIT* PICTURE IS EVEN *PRETTIER* . . .
WITH **CLEVELAND** MODEL AB DIALMATICS ON THE JOB

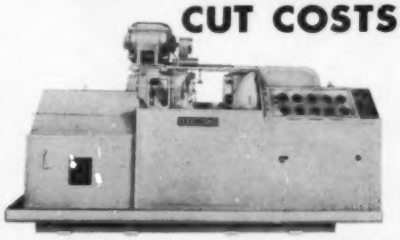
A quick look into Cleveland design will show you why these versatile Model AB Cleveland Single Spindle Automatics will deliver profitable performance for your shop. The many quick set-up aids, including electric turret feed drive and universal camming . . . the broad spindle speed range . . . the maximum accessibility for tooling and operation . . . the rugged construction . . . these combine into an automatic which will produce large or small quantities of accurately turned and formed parts, at the high speeds and low cost required by modern industry.

A Cleveland sales engineer will gladly give you the complete story—or let us submit a proposal and production estimates based on part prints of your work, without obligation.

● The photo above shows a Cleveland 3" Dialmatic producing a 6¾" long Drive Sleeve from A.I.S.I. 1320 C.R.S. Operations include forming both ends of the piece from cross slides; turning the major diameter from turret; step drilling a 0.550" and 0.705" hole, 1.687" deep; reaming full depth to 0.001" tolerance and cutoff with independent cutoff attachment.

Remember

CLEVELANDS CUT COSTS!



CLEVELAND 3" MODEL AB DIALMATIC

Also made in 2½", 4¼" and 5¾" sizes. Write for bulletins giving design details and specifications.

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for better results use
the J&L cold finished steel
with a reputation for:

- easy, consistent machinability
- good heat-treating properties
- high cold-drawn physical properties
- wide range of applications

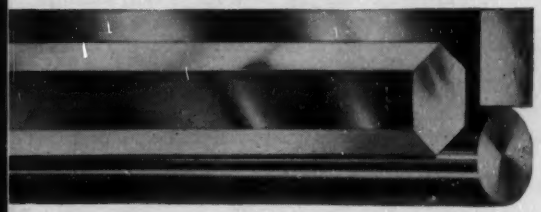
Jalcase was developed in J&L's metallurgical laboratories to meet the need for a free-cutting open-hearth steel with the mechanical properties required for high quality machined parts.

Today, specifications are standardized within the steel producing industry and S.A.E. and A.I.S.I. numbers have been assigned:

LOW CARBON GRADES		HIGH CARBON GRADES	
Jalcase Designation	A.I.S.I. Number	Jalcase Designation	A.I.S.I. Number
Jalcase—1	C-1113	Jalcase—7	C-1137
Jalcase—2	C-1114	Jalcase—8	C-1141
Jalcase—3	C-1116	Jalcase—9	C-1144
Jalcase—4	C-1117		
Jalcase—5	C-1118	Jalcase—10	C-1144 specially processed
Jalcase—6	C-1119		

And, J&L's Jalcase continues to maintain leadership in this group of steels.

J&L STEEL



When you specify "JALCASE," you can depend upon those qualities that help you obtain better production . . . longer tool life . . . lower overall costs. Remember to say "JALCASE" when you order.

Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

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JONES & LAMSON
MODEL FC-30 OPTICAL COMPARATOR

with Electronic, Variable Speed Vertical Measuring Control

Easy, close access to 30″, eye level screen
New brilliant surface illuminator

Thirty-five years' experience in developing optical comparators—16 years' experience with 30″ viewing screens—has gone into making this ultra-modern precision inspection machine.

Built to highest machine tool standards, its wholly integrated design allows the operator to view the entire screen at close range while making quick, accurate measurements.

Electronic, variable speed vertical measuring control allows the work piece to be raised or lowered, slowly or rapidly to the exact measuring point desired. Imagine — quick, precise measurements to .0001″, in one motion, with fingertip pressure.

The FC-30 also has these additional *exclusive features:* 5″ and 8″ diameter capacity with easy change-over; 6″ projection lens optional; carbide tipped micrometers graduated for direct reading in either direction, combined with micrometer zeroing anvil; measuring dial illuminators.

Available for immediate delivery.

P.S. *Write today for folder containing complete information.*

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The "HALIR" violin from the collection of Frederick S. Haenel, Gaylordsville, Conn.

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CUT INVENTORY COSTS, ORDER FROM YOUR LOCAL DISTRIBUTOR

There is a quality

21" sliding head drills are available in box and round column models. Multiple-spindle arrangements up to 6 spindles are available. Three distinct methods of feed are incorporated as standard equipment. Three optional ranges of power feed are provided. Eight spindle speeds—76 r.p.m. to 2025 r.p.m.

16"-3000 sliding head drills are available in both floor and bench models, and with multiple-spindle arrangements up to 6 spindles. Six spindle speeds are provided.

21" Box Column Floor
$1624.00*

16"-3000 Floor
$631.00*

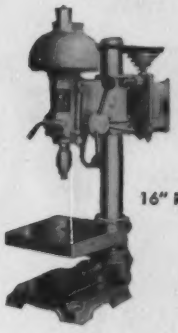
for every job and every budget

For drilling operations 1½" OD and under, Cincinnati Drills combine dependability with economy. Regardless of your drilling jobs—production, maintenance or general machine work—there is a Cincinnati Drill to fit your needs. And they are the only quality line of drills at these low, low prices.

For complete information and prices, write on company letterhead for the name of your nearby Cincinnati dealer. Cincinnati Lathe & Tool Co., 3250 Disney, Cincinnati 9, Ohio.

For a clear comparison of Cincinnati Lathes with other equipment, write for a free copy of "Management Facts About Lathes".

Cincinnati Drill



16" Royal Bench
$93.00*

18" Royal Bench
$246.00*

16" Royal Floor
$103.00*

The Royal line of Cincinnati Drills includes both 16" and 18" sizes in floor, bench and multiple-spindle arrangements. They meet the demand for general purpose, sensitive drills capable of production work at a minimum investment.

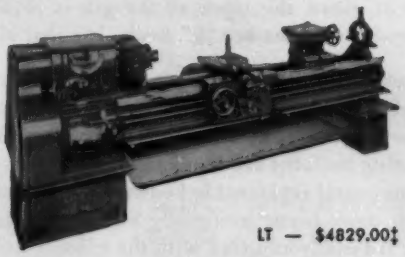
center on . . .

cincinnati lathes and drills

*Less motor and controls.
†10" x 24" std. drive. Includes motor and controls.
‡16" x 32". Includes motor and controls.
All machines F.O.B. factory.
All prices subject to change without notice.

THERE IS A COMPLETE LINE OF CINCINNATI TRAY-TOP AND LT LATHES

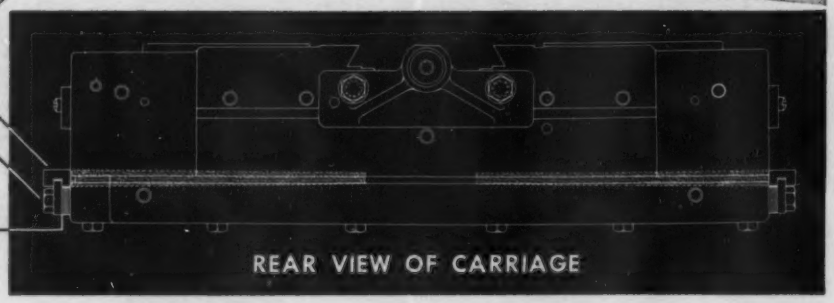
Tray-Top — $1793.00†



LT — $4829.00‡

RENEW LATHE CARRIAGE ACCURACY ...just discard 7¢ shims!

In Lodge & Shipley's exclusive design, all wear takes place uniformly under the carriage . . . where it is easily compensated by gibs designed for quick, accurate adjustment.



That's right! Remove a shim at each of four gibs and you've made an accurate .001" tightening adjustment, since the taper of the gib is .016" per inch and the shims are 1/16" thick. It's that simple.

The Lodge & Shipley carriage and gibs design is but a single example of many Model-X lathe features that save time and maintain accuracy. Carriage V-bearing surfaces are hand scraped to the special hardened steel replaceable bedways. Wear, when it occurs, must occur uniformly under the carriage where it's easily adjusted with the gibs.

Lodge & Shipley Lathes combine long-lasting accuracy and low-cost operation with versatility and productivity . . . and prove their worth in a series of case histories available on request.

THE **Lodge & Shipley** COMPANY

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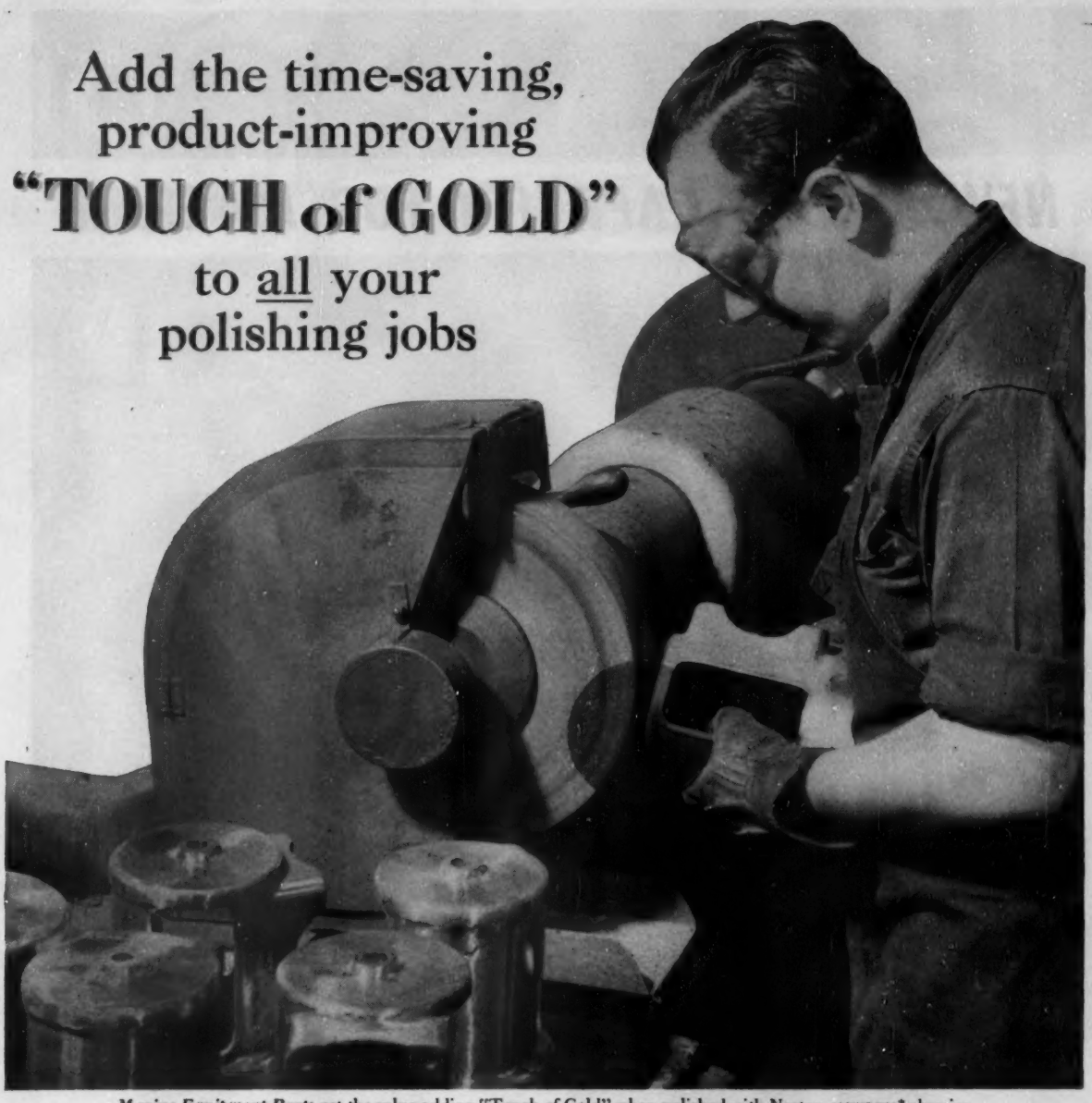
....your **LODGE-ical** *choice!*

Add the time-saving, product-improving "TOUCH of GOLD" to all your polishing jobs



Marine Equipment Parts get the value-adding "Touch of Gold" when polished with Norton ALUNDUM* abrasive

When you standardize on Norton ALUNDUM abrasive, every polishing job you do gets off to a better start — and finish!

One reason is because the grains in this Norton-developed abrasive are thoroughly uniform in size, structure and chemical composition. Which means thoroughly uniform polishing, with no oversized grains to mar surfaces, and no flats, slivers or undersized grains to loaf on the job. And you get *fast* polishing, too, because ALUNDUM abrasive is famous for rapid, clean-cutting action.

Another reason is that ALUNDUM is specially processed to give it high capillarity. With *all* grains soaking up cement or glue uniformly and adequately, *each* grain is held firmly — assuring long-lasting, top-performing polishing wheels.

These Advantages In YOUR Polishing

mean better-finished, better-looking products in less time and for less money — the sure "Touch of Gold" you can add to all your set-ups, manual or automatic.

Your Norton Distributor

can supply you promptly with ALUNDUM polishing abrasive in the types, sizes and surface treatments you need. Or write to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities, listed in your phone directory yellow pages under "Grinding Wheels." *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass. G-270

NORTON
ABRASIVES

Making better products... to make other products better

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

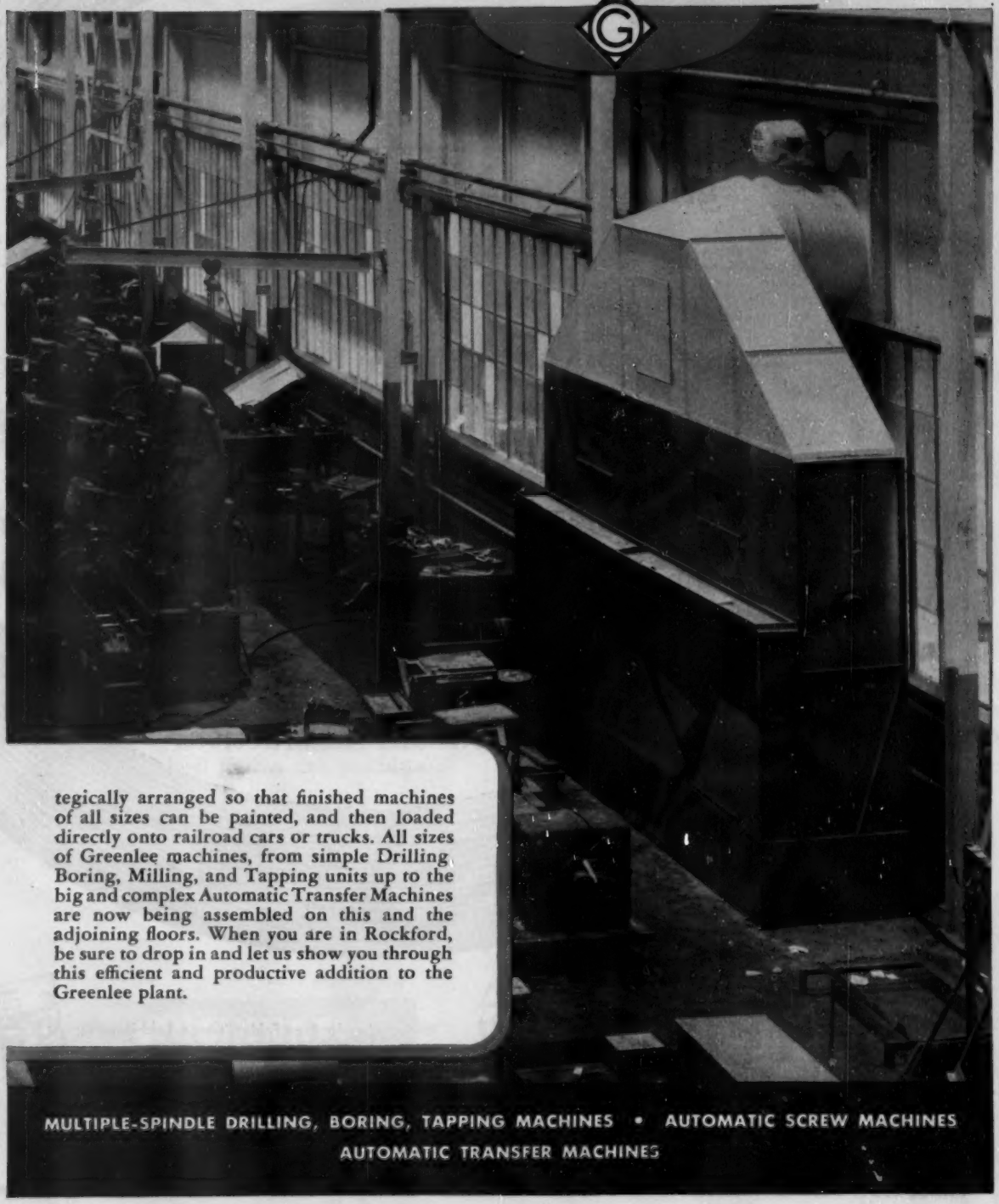
NEW, ADDED CAPACITY FOR MACHINE

Since 1918, Greenlee has pioneered in the development, design, and manufacture of Transfer Machines and other Special Machines for all branches of the metal-working industries. Now, in order to increase and improve the facilities for assembling Special Production Machines of all kinds, the big bay shown in this picture has been added to the Greenlee factory. It is equipped with all up-to-date services, equipment, and arrangements for speeding up machine assembly, and is stra-

GREENLEE BROS. & CO.

1730 MASON AVENUE, ROCKFORD, ILLINOIS

ASSEMBLY AT GREENLEE



tegically arranged so that finished machines of all sizes can be painted, and then loaded directly onto railroad cars or trucks. All sizes of Greenlee machines, from simple Drilling, Boring, Milling, and Tapping units up to the big and complex Automatic Transfer Machines are now being assembled on this and the adjoining floors. When you are in Rockford, be sure to drop in and let us show you through this efficient and productive addition to the Greenlee plant.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES
AUTOMATIC TRANSFER MACHINES

Chase Copper Alloy Wire

gives you these finer qualities...

Chase wire combines *high ductility* with *great tensile strength.* Result: excellent spring properties. Chase wire has great uniformity of set and temper. Result: it uncoils without time-wasting twists and tangles. Chase wire has precisely uniform gauge... texture... color... is free from physical defects. Next time *you* need wire, ask for the finest...call your Chase wholesaler or the nearest Chase warehouse.

Result: satisfaction!

Chase ®

BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

Write Today for Free Folder "Chase Cold-Heading Extruded Brass and Copper Alloy Wire."

The Nation's Headquarters for Brass & Copper

Albany†	Chicago	Denver†	Kansas City, Mo.	Newark	Pittsburgh	San Francisco
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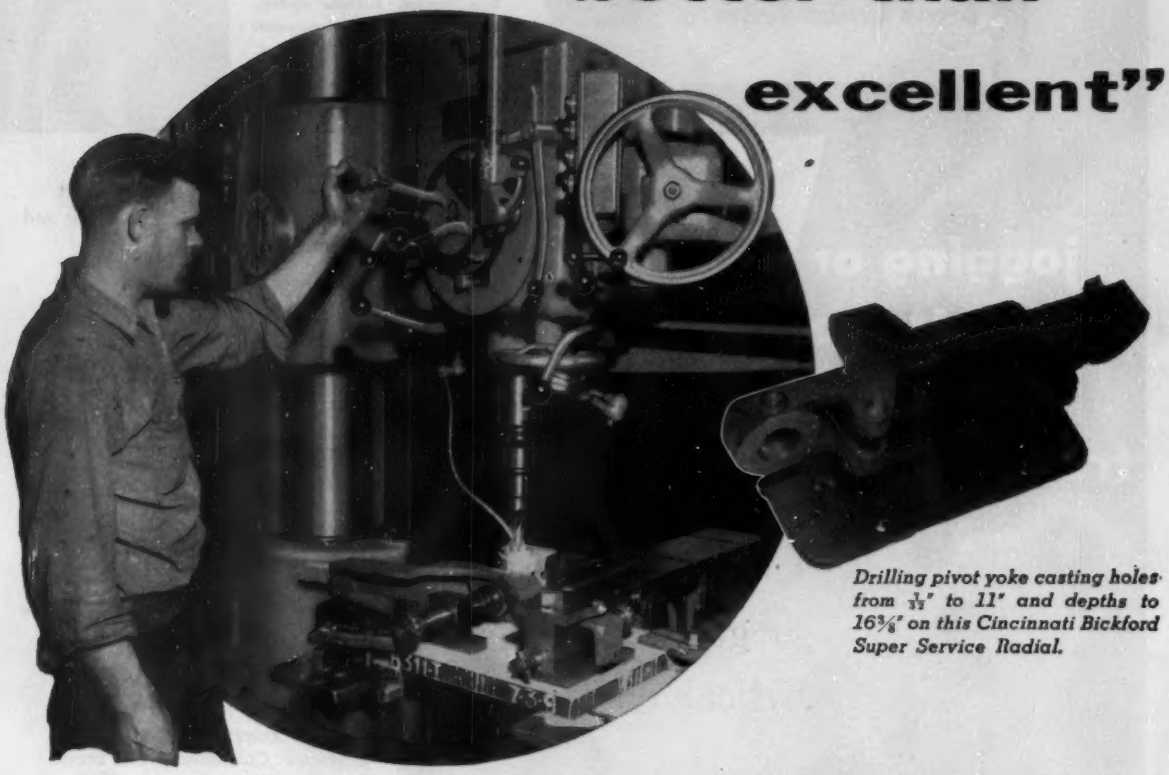
CHASE NOW SELLS STAINLESS STEEL, TOO!

an outstanding performance...

"better than excellent"



Drilling pivot yoke casting holes from $\frac{1}{32}$" to 11" and depths to 16$\frac{3}{8}$" on this Cincinnati Bickford Super Service Radial.

A prominent truck manufacturer has increased shop capacity in heavy drilling with this Cincinnati Bickford Super Service Radial Drill. They say "Better than excellent performance and for ease of handling, the best in this size machine".

The illustration shows the convenient grouping of controls which makes for easy, fast handling. Note the operator's unobstructed vision of the work, even with the head in a low position. These features can increase your output.

Write for Booklet R-29 on these highly productive and accurate Cincinnati Bickford Super Service Radial Drills.

CINCINNATI BICKFORD

RADIAL AND UPRIGHT DRILLING MACHINES

THE CINCINNATI BICKFORD TOOL CO.

Cincinnati 9, Ohio, U.S.A.

another
Columbia
press brake feature

specially designed air clutch and brake

Self-adjusting clutch, installed in heavy, balanced flywheel, cushions shock, assures long, trouble-free service. Multiple spring-loaded brake stops ram automatically when clutch is disengaged.

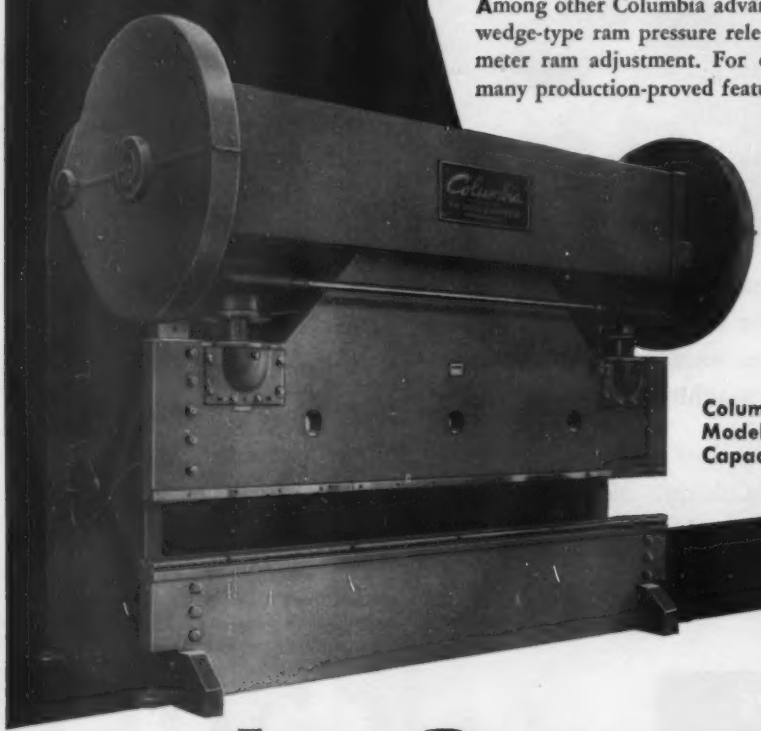
jogging or one stroke ...it's trouble-free

Columbia "New Series" Power Press Brakes incorporate years of experience in the heavy metal working field with time, labor and cost-saving features of the most advanced design.

Typical are the air clutch and spring brake, particularly designed for press brake service. The smooth operating, positive clutch is installed in a heavy, balanced flywheel. Drive to the gearing is by a heavy alloy steel shaft.

When the clutch is disengaged, the disc type friction brake is automatically applied, holding the ram in any position without creeping. The air clutch and brake are available on series 180 and larger size Columbia press brakes.

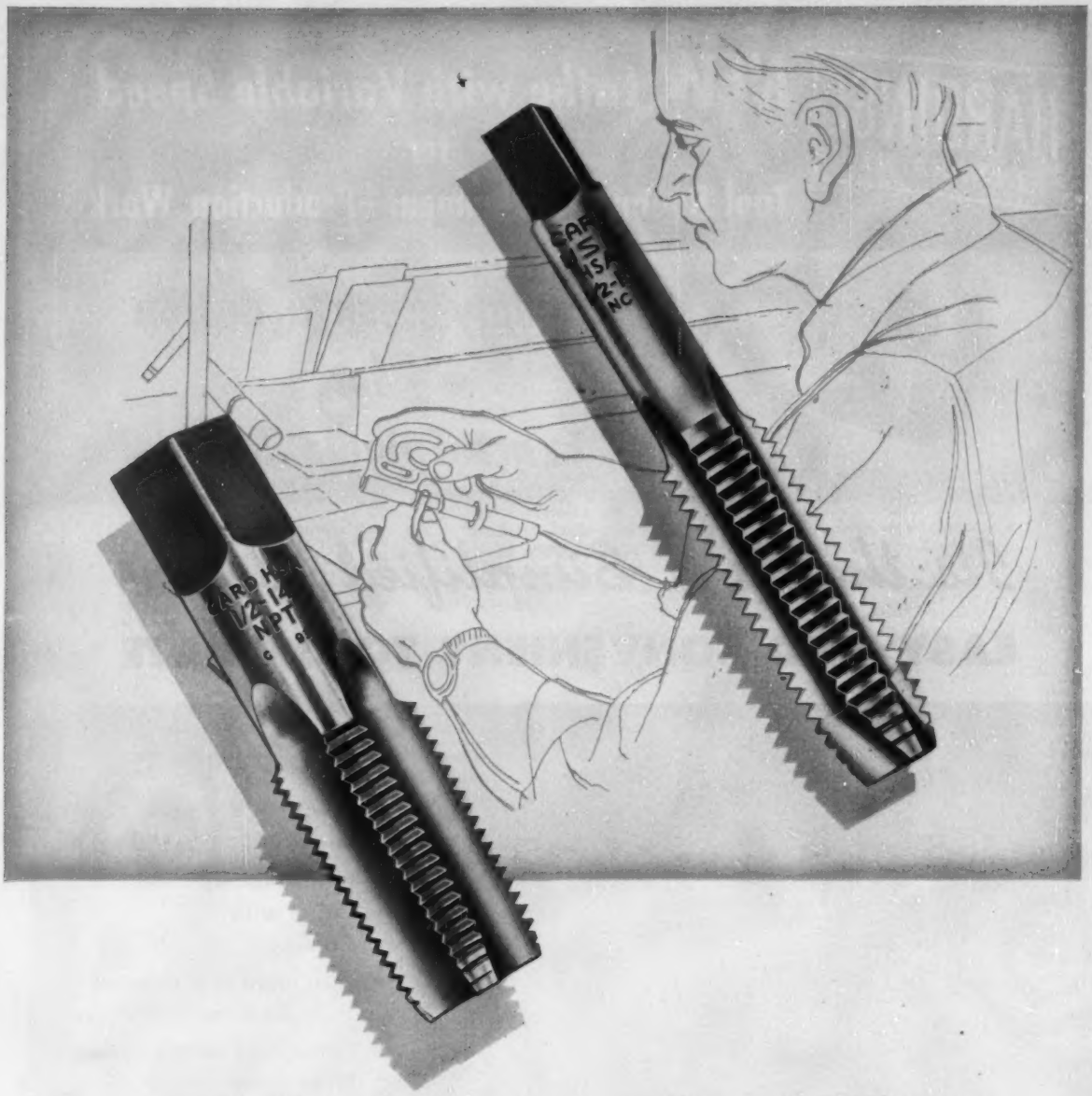
Among other Columbia advanced design features are the exclusive wedge-type ram pressure release and the motor-operated micrometer ram adjustment. For dependable performance, check the many production-proved features of rugged Columbia Press Brakes.



Get the complete story on exclusive Columbia press brake features. Write for new FREE Bulletin No. PB-1 and the name of your nearest distributor.

Columbia Power Press Brake, Model 180-12. Capacity, 12′ x ¼″.

COLUMBIA DIVISION *THE* Lodge & Shipley CO HAMILTON 2, OHIO



TAPS *by* CARD

The best way to gauge the value of a tap is to try it. You'll find Card taps live up to their reputation every time.

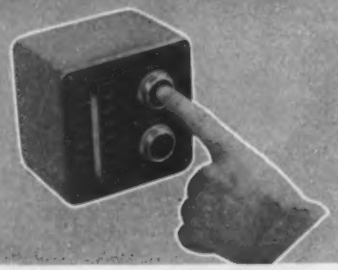
The CARD Quality

Completely stocked offices at Atlanta, Chicago, Detroit, Fort Worth, Los Angeles, New York, San Francisco and Seattle
See your local Card distributor for prompt deliveries and helpful service

S. W. CARD MANUFACTURING CO., MANSFIELD, MASS. • DIVISION OF UNION TWIST DRILL CO. CARD Quality **TAPS • DIES • SCREW PLATES**

HARDINGE
ELMIRA, N.Y.

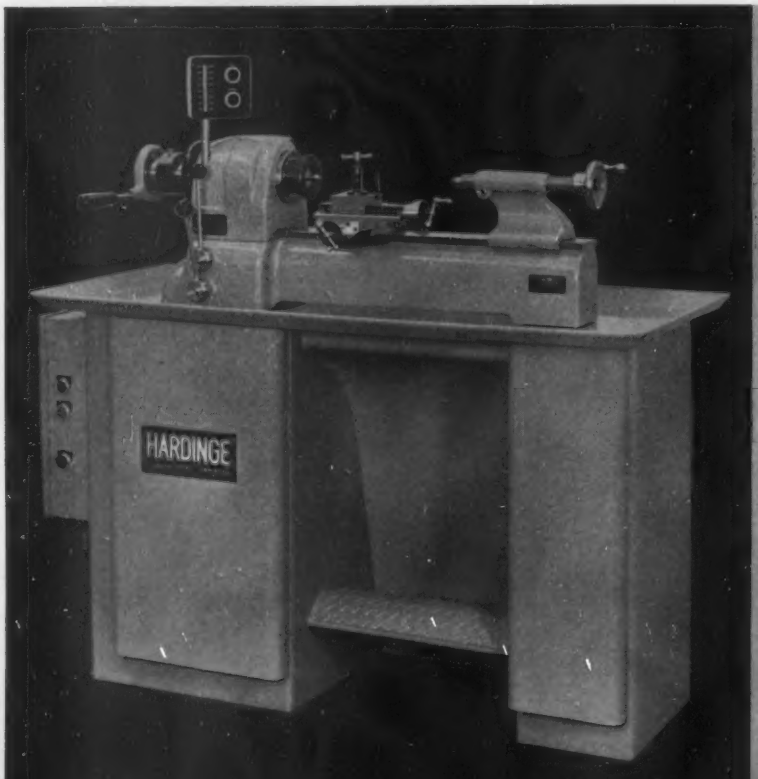
NEW Lathe with Variable Speed
for
Tool Room—Development—Production Work



Simply Push a Button for Exact Spindle Speeds

It's the NEW Simplified Design

EASY AND CONVENIENT TO OPERATE



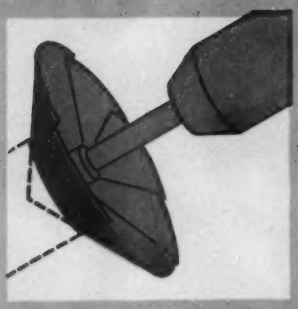
FEATURING:

- Infinitely Variable Speeds 230 to 3500 r.p.m.
- Fast Lever Operated Collet with 1⅛" Capacity
- Hardened and Ground Steel Dovetail Bed Ways
- Patented Positive Lock Slide Rest
- Full Bearing Tailstock
- And Other Cost Cutting Features

For Complete Information on this Precision Lathe Write for Bulletin DV59

HARDINGE BROTHERS, INC., ELMIRA, N. Y.

Saved minutes add up...



SLICK TRICK-

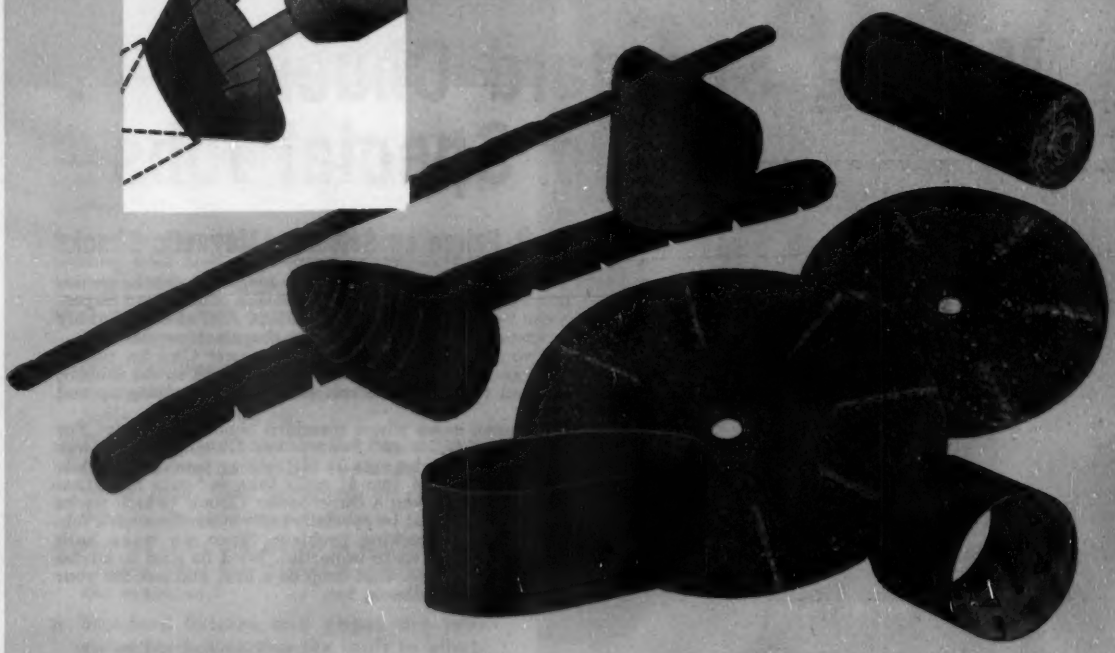
for radiusing the edge of a hole. On a portable tool, the "wings" of a METALITE Cloth Slotted Disc are thrown out flat by centrifugal force, but gradually fold in as the disc is pushed into the hole. You can see why it does a neat, quick, uniform job.

when you use these BEHR-MANNING ABRASIVE TOOLS

Take for instance, radiusing or deburring the edge of a hole. See (at left) how beautifully simple it is with a METALITE® Cloth Slotted Disc. You get the same time-saving result on any number of tricky jobs, with the many specially designed BEHR-MANNING® abrasive tools. They enable you to quickly finish all kinds of edges, contours, recesses, inside surfaces. Look over your operations and replace slow, clumsy hand methods with time-saving abrasive tools. The booklet, "Blueprints for Production," will help you. Write Behr-Manning Corp., Troy, N. Y., for your copy. Address Dept. AM-10.

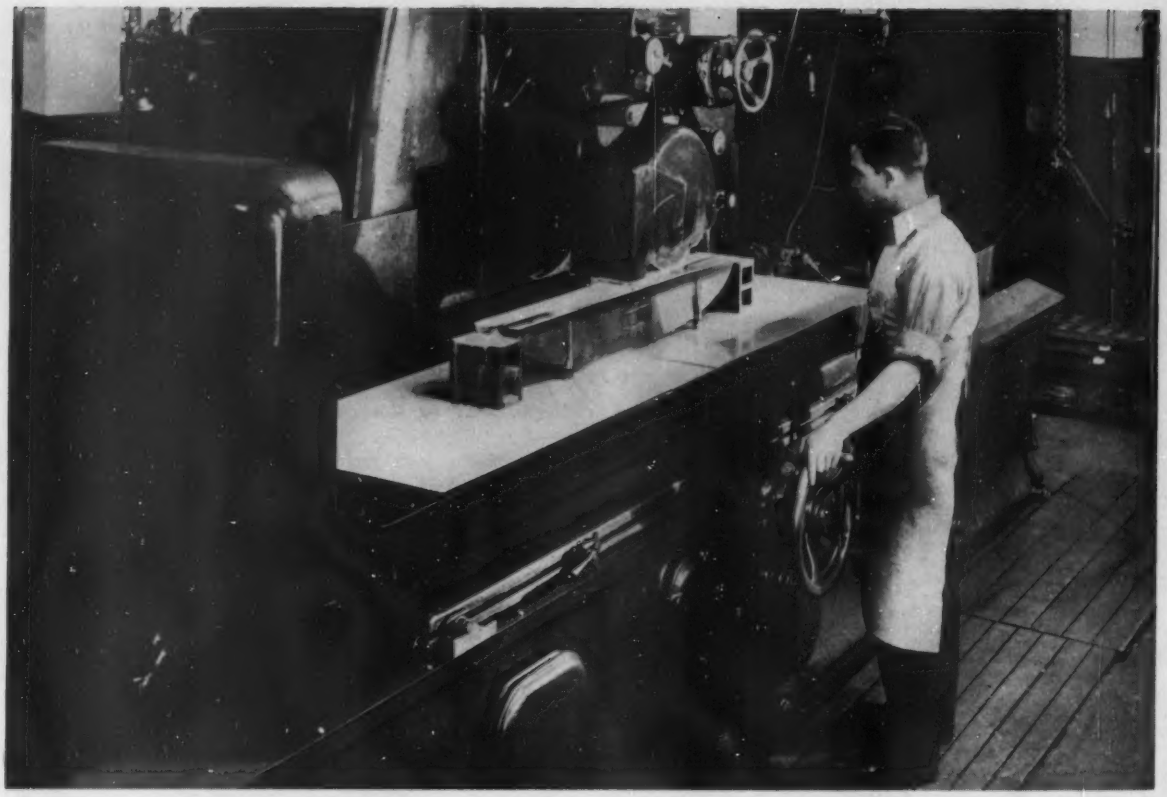
In Canada: Behr-Manning (Canada) Ltd., Brantford.
For Export: Norton Behr-Manning Overseas Inc., New Rochelle, N. Y., U.S.A.

G-3

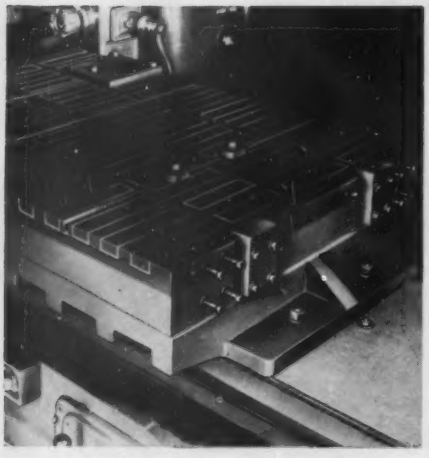


BEHR-MANNING® CORPORATION
division of NORTON Company

▲ COATED ABRASIVES
▲ SHARPENING STONES
▲ PRESSURE-SENSITIVE TAPES



Making Standard Chucks Do Special Jobs



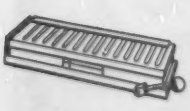
Tips from Taft-Peirce on Selecting Magnetic Chucks

Many times when a job requires an outsize magnetic chuck, an unusual shape, or a special setup . . . a combination of standard Superpower Chucks can be used to solve the problem. And at considerably lower cost. For instance, take the chuck on the machine above.

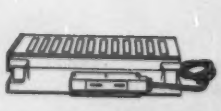
It's actually two standard 24″ x 48″ Superpower Chucks, placed end to end. This tandem arrangement provides a split in the middle, which operators find valuable for a reference point in setting up and machining work.

There are, of course, cases where standard chucks won't do. For example, the special 55½″ x 40″ Superpower Chuck, at left, was built to hold cast iron loomsides on a 75 HP milling machine — while three 18″ carbide cutters and two 4″ mills take ¼″ cuts simultaneously at 30″ per minute. Even a Superpower Chuck (which packs more power in less space) must be specially built to handle such a job.

Perhaps you've got a chucking problem. Since we make both standard and special chucks we're impartial. We'd be glad to advise you which is best for your job. Just drop us a line, and ask for your copy of the Taft-Peirce Handbook, too.



PERMANENT MAGNET CHUCKS



RECTANGULAR ELECTRO-MAGNETIC CHUCKS

ADJUSTABLE ELECTRO-MAGNETIC CHUCKS

ROTARY ELECTRO-MAGNETIC CHUCKS

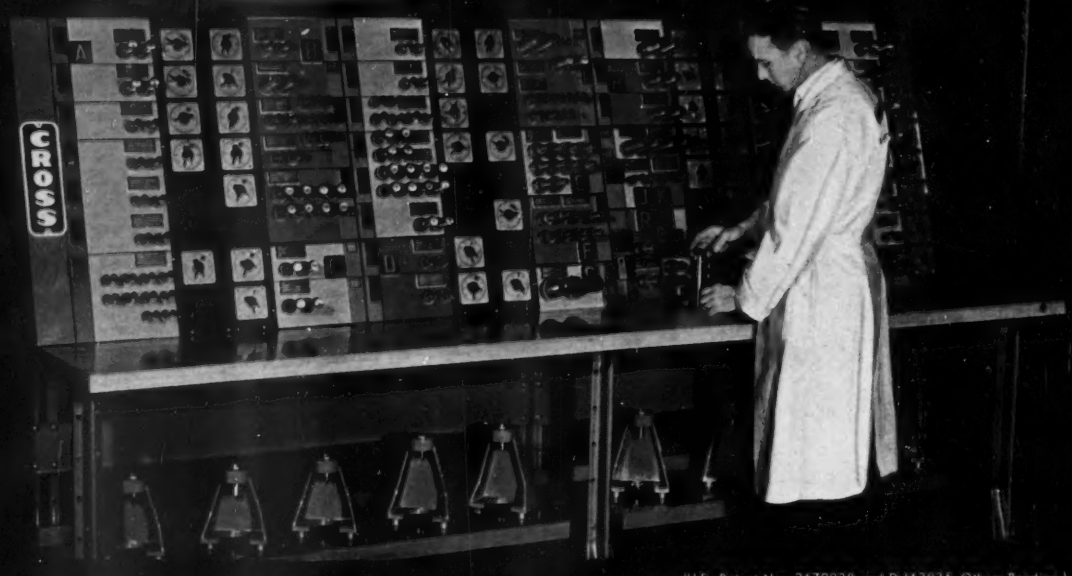
T-P means Top Precision

T P

THE TAFT-PEIRCE MANUFACTURING COMPANY, WOONSOCKET, RHODE ISLAND

A Mechanical Eye to Watch Your Tools

Cross Machine Control Units Reduce Downtime and Tool Costs



(U.S. Patent Nos. 2679038 and D-163935. Others Pending.)

The Machine Control Unit was originated by Cross to solve tool changing and down-time problems in machines with multiple tooling.

Available for drilling, milling, boring, turning and similar machines, the Control Unit provides many benefits:

- ★ **It reduces tool expense by minimizing breakage and grinding.**
- ★ **It is equipped with Toolometers which automatically stop the machine when tools need changing.**
- ★ **Other tools indicated by the Toolometers as *almost* used up are replaced at the same time. This grouping of changes drastically reduces downtime.**
- ★ **Pre-set tools are stored in the Machine Control Unit for instant availability at the machine.**
- ★ **Standard fixtures and gages are provided for pre-setting the tools to eliminate downtime for machine adjustments and trial cuts.**

Over 300 Cross Machine Control Units are now successfully reducing manufacturing costs in plants throughout the country. It will pay you to write, wire or phone for full information *today*.

Master tool setting fixtures and two standard types of gages for pre-setting tools.

Established 1898

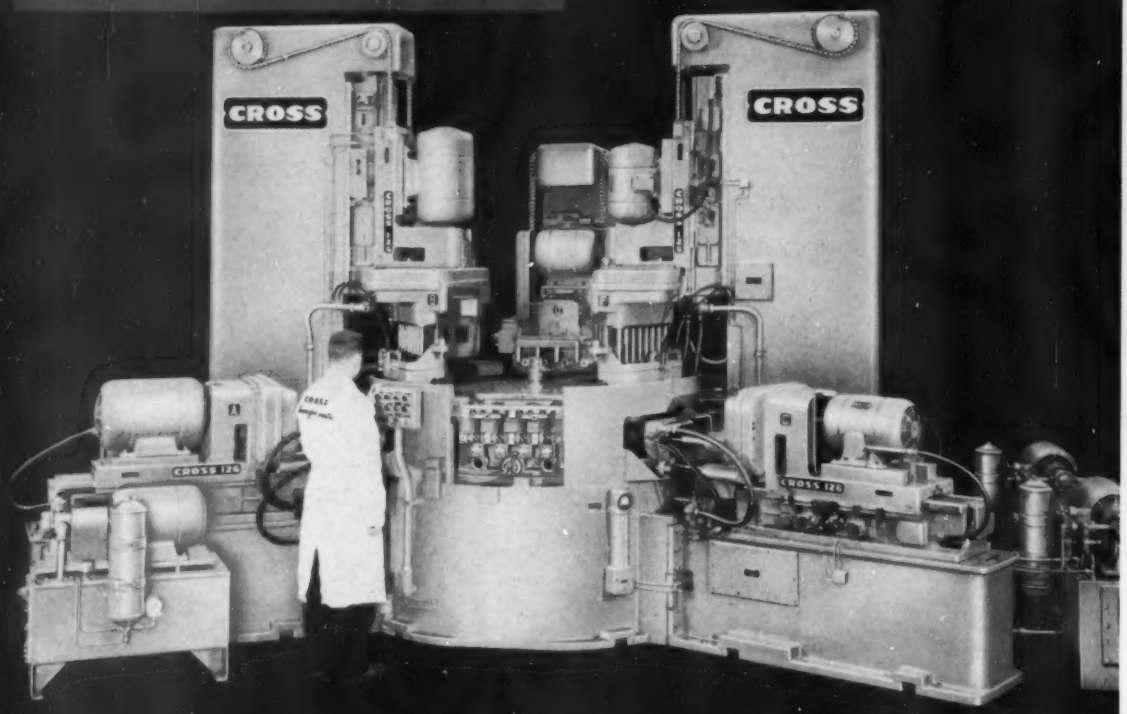
THE CROSS CO.

DETROIT 7, MICHIGAN

***Special* MACHINE TOOLS**

Drills, Reams, Chamfers, and Mills Connecting Rods

Another Special by Cross



- ★ 450 pieces per hour at 100% efficiency.
- ★ 6 stations: 1 for loading, 2 for drilling, 1 for chamfering, 1 for milling, and 1 for reaming.
- ★ Drills, reams and chamfers bolt holes; drills, reams and chamfers piston pin hole; and mills lock slot.
- ★ Fluid motor driven index table.
- ★ Hydraulic power clamping for work holding fixtures.
- ★ Other features: Hardened and ground ways; coolant system; hydraulic feed and rapid traverse; construction to J.I.C. standards.

Established 1898

THE CROSS CO.

DETROIT 7, MICHIGAN

Special MACHINE TOOLS

WHY IT PAYS TO BUY STAINLESS BARS FROM US

TRIPLE SECURITY

What you want
When you want it
At the right price

ONE of our experienced stainless men will be glad to work with you on stainless steel selection problems so that you can use the most effective and economical grades and sizes. And we follow through from design to delivery to make sure that you get exactly the steel specified for the job. With complete stocks of dependable USS Stainless Steels, fast delivery service, and competent, thorough technical assistance, we offer a real cost-cutting combination.

Whatever your demands, it'll pay you to call on U. S. Steel Supply the next time you need stainless steel. Our unusually complete stocks of USS Stainless include bars—rounds, squares, hexagons, angles, channels, and the widest selection of grades, sizes and finishes of sheets and strip available.

For further information on stainless steel, just send us the coupon.

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Please send me, without obligation, your literature containing complete information on your Stainless Steel stocks and service.

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At Kaydon ENGINEERING CORPORATION:

Maintenance Costs on KING

VERTICAL BORING & TURNING MACHINES

Less than $25 a year PER MACHINE!

Photo courtesy of American Machinist.

A 65¼" dia. Bearing Ring is shown being machined on a 72" KING Vertical Boring & Turning Machine at The Kaydon Engineering Corp. Accurate machining of these large diameter, thin sections is essential, since machining distortion cannot be removed by heat-treating.

The Kaydon Engineering Corporation, Muskegon, Michigan, manufactures a complete line of high precision ball and roller bearing assemblies, with rings of 4" bore to 120" OD. An essential part of Kaydon's distortion control methods for manufacturing these large diameter bearing rings having thin sections—often under ½" at the raceway—is *accurate* machining of the ring OD, face, and groove on KING® Vertical Boring & Turning Machines. (See photo above.)

Mr. Maurice Jensen, General Superintendent of the Kaydon Engineering Corporation, makes the following statement concerning his experience with KING machines: "Three 72" Kings have been in operation for about two years, 24 hours a day, five days or more per week, and our total maintenance cost for the three machines has been less than $25 a year per machine. One 72" King has been in operation for ten years with less than $50 yearly maintenance cost over this period."

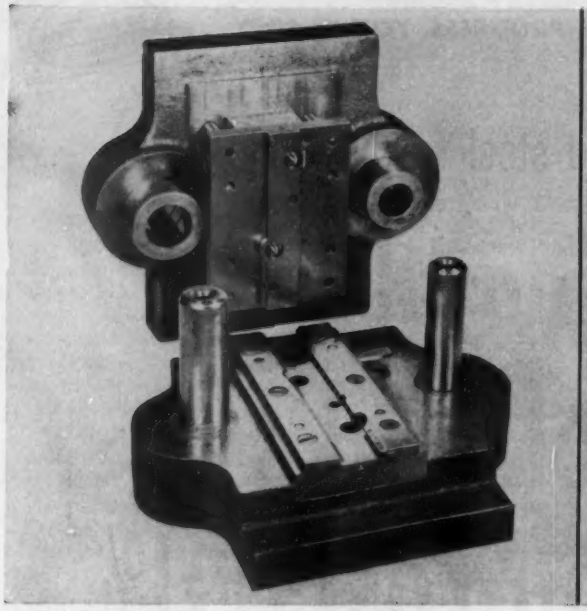
Mr. Jensen further states, "It is possible to consistently produce pieces from these machines with a maximum eccentricity of .001. For high production runs and machining approximately .100 for a finish cut, we have successfully maintained a .005 tolerance, and we have found that the dial readings will repeat and give us a maximum variation of .003 to .005."

Here again is on-the-job evidence of typical KING performance . . . and why KING is industry's *first choice for accurate, economical work.* KING machines are made in 10 sizes, 30" to 144", in a variety of head combinations. Look into their advantages for *your* production.

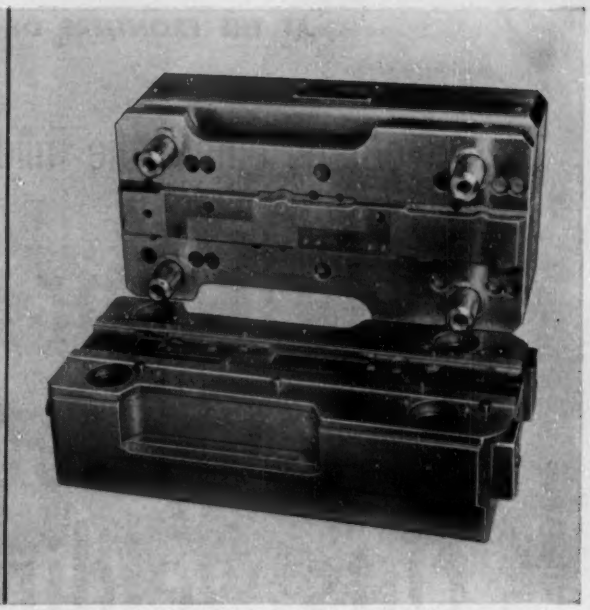
American Steel Foundries

KING MACHINE TOOL DIVISION

1150 TENNESSEE AVENUE CINCINNATI 29, OHIO



Simple progressive washer die, used at Precision Spring Company, Detroit, Michigan, pierces and blanks spring-tempered steel washers. With millions of accurate hits per sharpening, this die builds profits by cutting costs.



Complex lamination die punches two high-silicon "L" laminations per stroke. Dies of this type are in use throughout the metal-working industry, outwearing and outproducing steel dies by up to fifty times.

Dies equipped with CARBOLOY® CEMENTED CARBIDE increase production from 10 to 50 times

Over a wide range of applications, Carboloy cemented carbides have proved their superiority to steel by increasing production and cutting costs.

Here are some of the actual results achieved when users of large and small, simple and complex dies, switched from steel dies to dies equipped with Carboloy cemented carbide:

Lamination die. With Carboloy cemented carbide, production runs averaged 35 times longer than possible with steel.

Pierce and cutoff die. At 400 strokes per minute, carbide-equipped dies produced 2,000,000 strokes without resharpening.

Blanking and drawing die. Carbide-equipped die lasted months before resharpening. Steel required maintenance every week.

Deep drawing die. With Carboloy cemented carbide, manufacturing time per 100,000 pieces was slashed from 70 hours to 52 hours.

Explore the possibilities of using Carboloy cemented carbides in your dies. Carboloy engineers will give you or your die-maker every possible assistance. And, you can have your key men trained at the Carboloy Die School in Detroit.

Carbides are simple to use, easy to maintain. They'll pay for themselves through increased production, fewer rejects, reduced downtime and higher quality.

For complete information or for free Carboloy Die Engineering Manual, send coupon, today.

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLOY
Department of General Electric Company
11149 E. 8 Mile Ave., Detroit 32, Michigan

- ☐ Rush me free Carboloy Die Engineering Manual D-124.
- ☐ Send complete details on free Carboloy Die Training School.
- ☐ Have a representative of the Carboloy Engineering Appraisal Service call at my plant, at no obligation to me.

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

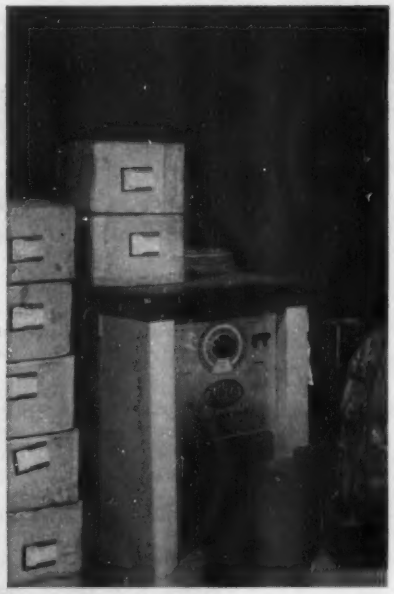
AT THE FRONTIERS OF PROGRESS YOU'LL FIND . . .

AN AIR REDUCTION PRODUCT

Aircomatic enters the mild steel welding field!

Fabricator welds 19,200 steel tanks... cuts welding costs 41%

with **AIRCOMATIC!**



AIRCO®

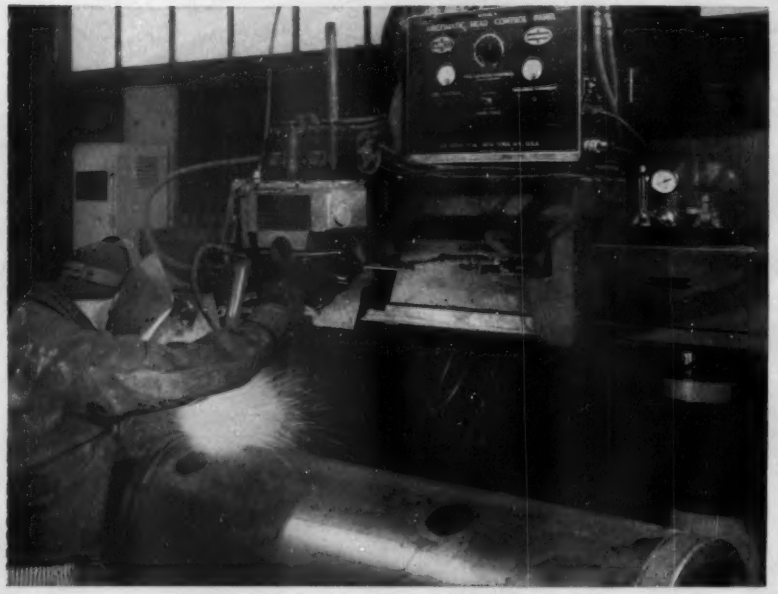
Airco's inert-gas shielded metal arc method, Aircomatic®, has long been the fastest, most effective way to weld "problem" metals like aluminum . . . copper . . . nickel, etc.

Now alert fabricators are employing this method on mild steel, with truly gratifying results.

The Collins Concrete and Steel Pipe Co., for instance, reports that Aircomatic has cut welding time 75% per steel tank – from 15 minutes to 3¾ minutes. On an annual output of 19,200 units, this adds up to a saving of slightly more than 3600 man hours. As a result, labor and overhead costs have been slashed 41%, not including hard-to-compute savings such as reduced handling time and the elimination of weld cleaning.

Aircomatic puts down from 10 to 25 pounds deposited metal per arc hour. This is obviously an increase over most other welding processes. Other advantages add to over-all time savings: good penetration means less joint preparation . . . absence of slag and spatter makes for minimum postweld cleaning and finishing.

If you weld mild steel on a production basis, wouldn't it be a good idea to talk over Aircomatic with an Airco representative? . . . It won't obligate you in any way. Or, if you'd like more information first, simply drop us a note – we'll send you details of the method, and information on how you can cut your production costs.



Collins Concrete and Steel Pipe Co., Portland, Ore., uses Aircomatic to weld the heads on steel hot water heater tanks. Welding time per tank has been cut from 15 minutes to 3¾ minutes.

2 more success stories for Aircomatic mild steel welding!

In the next 12 months, Cascade Manufacturing Co. of Portland, Oregon, will produce 12,500 hydraulic cylinder units using the Aircomatic process. Fabricated of SAE 1015 cold finished seamless steel tubing, the completed cylinders must withstand tests at 2600 psi. The uniform, high quality of butt and fillet welds with Aircomatic is evidenced by the fact that leakage on initial test is only 3½%.

Youngstown Steel Car Corp., Niles, Ohio, welds truck dolly wheels from pressed sections of SAE 1020 steel. When company engineers set up production schedules, they allowed 2 minutes welding time per wheel. To their surprise, the two Aircomatic heads weld the 2 wheel sections together at the rim and simultaneously weld a sleeve into the hub – all in 58 seconds.

AIR REDUCTION

60 East 42nd Street • New York 17, N. Y.

Divisions of Air Reduction Company, Incorporated with offices and dealers in most principal cities

Air Reduction Sales Company
Air Reduction Pacific Company

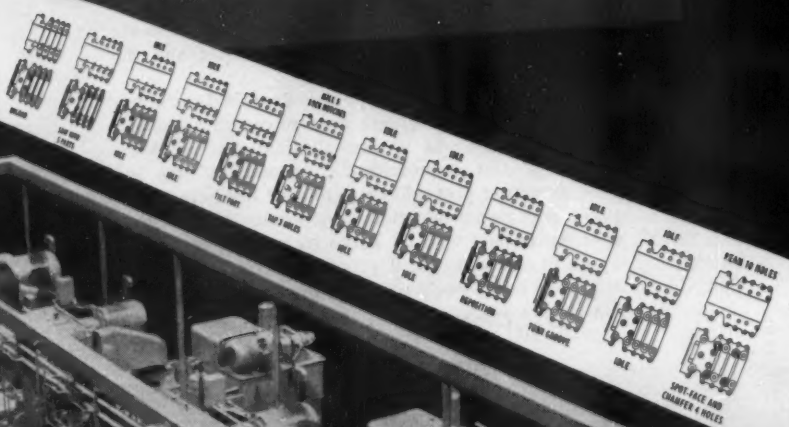
Represented Internationally by
Airco Company International

Foreign Subsidiaries: Air Reduction Canada Limited, Cuban Air Products Corporation

Products of the divisions of Air Reduction Company, Incorporated include: **AIRCO** – industrial gases, welding equipment, and acetylenic chemicals • **PURECO** – carbon dioxide, liquid-solid ("DRY-ICE") • **OHIO** – medical gases and hospital equipment • **NATIONAL CARBIDE** – pipeline acetylene and calcium carbide • **COLTON CHEMICAL COMPANY** – polyvinyl acetates and alcohols and other synthetic resin products

NEW NATCO HOLEWAY

...Speeds production and cuts costs!



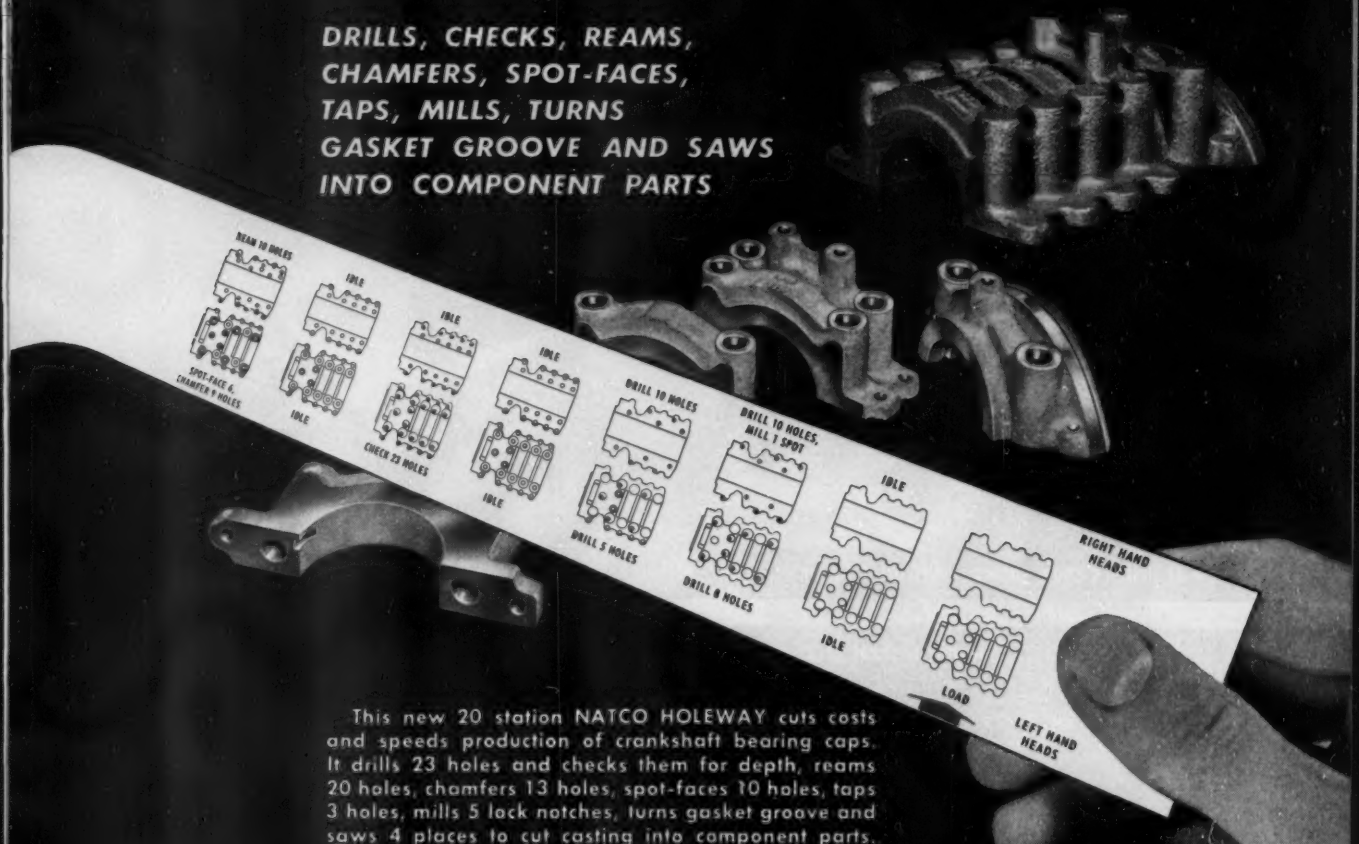
...ANOTHER MACHINE

NATCO ENGINEERED
for quality and quantity production

MACHINES 120 CRANKSHAFT BEARING CAPS PER HOUR!

...AT 85% EFFICIENCY

DRILLS, CHECKS, REAMS,
CHAMFERS, SPOT-FACES,
TAPS, MILLS, TURNS
GASKET GROOVE AND SAWS
INTO COMPONENT PARTS



This new 20 station NATCO HOLEWAY cuts costs and speeds production of crankshaft bearing caps. It drills 23 holes and checks them for depth, reams 20 holes, chamfers 13 holes, spot-faces 10 holes, taps 3 holes, mills 5 lock notches, turns gasket groove and saws 4 places to cut casting into component parts.

Above is shown a schematic drawing of the operations performed at each of the 20 stations and photographs of the parts before and after machining.

Call a Natco Field Engineer

to help you solve your problems in
Drilling, Boring, Facing and Tapping

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Indiana

Branch Offices

CHICAGO, Room 202, 6429 W. North Ave., Oak Park • DETROIT, 10138 W. McNichols Rd.
BUFFALO, 1807 Elmwood Ave. • NEW YORK, 35 Beechwood Ave., Mount Vernon

How United fabricates

Overall view of United's shop, showing units after assembly.

Shearing a sheet of 22-gage Stainless Steel.

Forming a component of a milk dispenser on a brake.

Refrigerator Company milk dispensers from Stainless Steel

Hudson, Wis., firm has worked Stainless successfully since 1940 with standard equipment; produces 100 units daily

● Using the same equipment with which mild steel is fabricated and making only a few appropriate minor changes in shop practices, United Refrigerator Company, Hudson, Wis., is currently fabricating Stainless Steel milk dispensers at a rate of up to 100 a day.

The milk dispensers, providing cold milk in glasses in schools, restaurants and the armed forces, are made primarily of 22-gage Stainless Steel. Fabricated parts include exterior top and back; ends; bottom support; liner back top, sides and bottom; liner filler; filler backing strip; door cover; interior door pan; lower panel; stiffener, and lower front.

United has been manufacturing these dispensers since 1951 and has been fabricating Stainless Steel since 1940. Experience has shown that Stainless fabrication presents no special problems. No special equipment is needed for Stainless jobs; all steps described here take place on standard equipment.

The only changes in shop practice when Stainless is worked involve the use of sharper dies, extra care and use of paper protection to prevent scratching the smooth stainless surface.

United's experience proves once again that "Stainless Steel is not difficult to fabricate—it's just a little different." And United States Steel's representatives will be happy to help you minimize this difference by recommending the right grade of Stainless and the most efficient fabricating methods.

Spot-welding Stainless Steel.

FABRICATING OPERATIONS

SHEARING—Four end pieces are cut from an 84″ x 32¾″ sheet without waste. A ten-inch shear rated 14-gage capacity is used for shearing all parts.

PUNCHING — Nail, screw and base holes are punched on a 40-ton punch press. There is no noticeable difference between Stainless and milder steels.

NOTCHING — Slits, V-notches and other cuts are made on 20 to 35-ton presses which handle Stainless as well as mild steels.

TAPPING—Doors are tapped for door lugs.

BRAKING—Nearly all exterior parts are brake formed. Special set-ups and die combinations permit rapid forming of a variety of bends in a series of quick operations. Dies are kept smoother than usual and paper protection is used. Several types of brakes are used.

SOLDERING — Corners and liner are soldered with acetylene and oxygen torches.

WELDING—Top, back and ends are spot-welded toge'her.

GRINDING — Sharp burrs on corners are removed with hand files and abrasive wheels.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS STAINLESS STEEL

USS

SHEETS · STRIP · PLATES · BARS · BILLETS
PIPE · TUBES · WIRE · SPECIAL SECTIONS

4-1871

UNITED STATES STEEL

REAMER USERS

P
Q
R
S
T

easy as

A
B
C

with

L & I

see pages 284-285

REAMER BUYERS

Backlash

EXTRACTS FROM CURRENT LETTERS TO THE EDITORS

I Did It

Referring to your article on the new Russian concept of cutting tools, (*AM*—April 12 '54, p170), this method of grinding lathe tools is not new. I myself used it 15 years ago for machining stainless steel when, in order to increase production without increasing the cutting speed, it was necessary to increase the feed.

The only difficulty we found was that the cutter had to be very carefully set and very carefully ground to insure that the third cutting face was set at the correct angle.

G. H. Armstrong,
Production Engineer
Crompton Parkinson Ltd.,
Chelmsford, England

What About Tolerance?

The general design of the tools shown in your article on Russian cutting tools (*AM*—April 12 '54, p140) was used by the writer when he was district manager for the Carboloy Co from 1928 to 1938.

If you are going to talk about roughing and finishing in one operation, then the reader can only assume that you do not care particularly about tolerances. It has been my experience that if the machine is rigid enough, the work would not be, so it is not good sense to attempt a roughing and finishing cut simultaneously, unless you have outlandish tolerances. But I have used this same principle by first taking a roughing cut and then going back for the finishing cut, using the same tool but never roughing and finishing simultaneously.

Arthur A Merry
Chief, Advanced Tool Engineering,
Pratt & Whitney Aircraft,
E. Hartford, Conn.

Male and Female

As a substitute for the terms "male" and "female," in reference to threads, molds, and dies, I am suggesting that the words "positive" and "negative" be used, as possessing more dignity and merit.

With the possible exception of "she" in speaking of a ship which, after all, is a very understandable term of endearment that sailors and the like feel towards their craft, sex

GRINETICS

BY D G SMITH

TANNING SOLUTION

AUTOMATIC TURNING DEVICE

MILLING MACHINE

Republication rights reserved

No. 3 in a Series

Conomatics demonstrate carbide tools

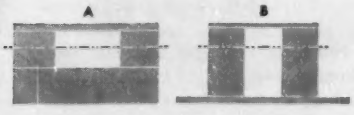
We believe you know that not every "automatic" job can be tooled successfully with 100% carbide. What we think you may not know is that the Conomatic Carbide Development program is making progress with such jobs. This relatively new Cone service is convincing to those who like to be shown that "it can be done".

Granted that experimental runs are not production runs, it has often been proved that under actual production conditions they have developed into production runs. A number of conditions must be met in the successful use of any tooling material. Carbide is no exception. If the comparisons of 100% carbide and HSS runs indicate as much gain as per the job illustrated, the reward is worth the effort.

For full particulars please consult your Cone Representative or inquire direct.

MATERIAL—EVERDURE: (96% copper, 3% silicon, 1% manganese) Hole drilled with 17/32" drill to 1½" depth; thread rolling of ½" pipe thread.

	HSS	CARBIDE
Cycle Time	35 secs.	15 secs.
Work Spindle Speed	420 R.P.M. at 124 S.F.	850 R.P.M. at 250 S.F.
Tool Wear	2000 pcs. per grind	5000 pcs. per grind



The CONOMATIC is the ONLY representative of Frame "A". The short, "weave-proof," upright members, secured between larger and heavier top bed and base, make possible the strongest type of bridged support to the tooling area and its "work and tool axis."

Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

SPEED-MARKS 12,000 PIECES PER HOUR
...Automatically

Tooled for high production marking of small metal parts (12,000 pieces per hour), Model 347 illustrated above, is a good example of Noblewest's ability to keep ahead of industry's demands for constantly higher marking speeds at lower cost. Featuring a hopper and dial feed combination, parts are fed to the machine by the hopper, marked and automatically ejected. Spring pressure controls the depth of the mark and insures uniform depth of mark from piece to piece regardless of slight variations in diameter. Noblewest is equally famed for fine marking dies . . . made to the most exacting standards of quality and with the all-important skill and know-how of master craftsmen. Whatever your needs for marking, Noblewest makes the machines, tools and dies to do the job faster, better, at lower cost. For complete details write to Noble & Westbrook Mfg. Co., 17 Westbrook Street, East Hartford 8, Conn.

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has no place in inanimate objects.

Industry already makes use of "positive" and "negative" in reference to the rake angle of cutting tools, and the substitution suggested above would be an easy and natural one to adopt.

This is in no way belittling sex which is very much a part of God's creation. It is rather more in the nature of keeping it in its proper sphere.

Malcolm K Parkhurst
New York City

Orchids to Librarians

I have read with interest your article 'Long Memory' (*AM*—Aug 30 '54, p125) about the man who remembered the article on drive gears which appeared 'a few years ago', but which actually was published in 1905.

I am sure it was a librarian at the University of Michigan who had the patience to check indexes back that far to locate the article.

It must have been a fine article and 'tis true the man had a fine memory, but this sort of searching goes on in libraries regularly, and something which was seen 'a few years ago' is usually found to have been published ten to twenty years before. Just routine checking—as Sgt. Friday would say.

Rachel MacDonald, librarian
Engineering Staff Library
Ford Motor Co
Dearborn, Mich

Old Stuff

I am afraid that Mr. Robert Seagrave is rightly annoyed (*AM*—May 10 '54, p100) by your publishing the article on Russian cutting tools (*AM*—April 12 '54, p140). It is quite late.

The Russian "force" machining method has been thoroughly described in a series of articles published in the well known Russian journal, Stanki i Instrument (Machine tools and tools) during the first half of 1953. It has also been mentioned and described by several West-European pubilications, and has been extended to milling and planing—the latter with HSS tools.

I have tried it in one case, where it gave good results in turning large (20-in.-dia) disks which could not be machined fast enough with conventional tools because of vibration. The operation, facing, was done in one cut, ¼-in. deep, 0.08-in. feed per rev (maximum on the machine), and resulted in excellent finish. Speed was 62 rpm, i.e. over 330 sfpm, decreasing toward the center.

M Barash
Haifa, Israel

We realize, of course, that this material has been published before, but not many of our readers are able to read Russian.—Ed.

Lord Kelvin

More than once, you have quoted Lord Kelvin in your articles. Would you have the kindness to enlighten me on his background? Where can I learn more about him?

Henry E Picarelli
Forest Hills, N Y

There are two biographies: Life of William Thomson, baron Kelvin of Largs, by S P Thompson, published 1910 by MacMillan Co, 60 Fifth Ave, New York, in 2 Vol; and Lord Kelvin, by Alexander Russell, published 1938 by Blackie & Son, Ltd, 17 Stanhope St, Glasgow, Scotland.

Lord Kelvin's outstanding contributions to science were in the field of electricity, heat, and magnetism, and he invented many electrical measuring instruments, as well as a mariner's compass and a navigational sounding machine. He was electrician for several submarine cables, president of the Royal Society, 1890-95, and chancellor of the University of Glasgow. Lord Kelvin represented the highest type of physicist as he combined powers of mathematical reasoning with the inventive faculty and manipulative skill of a great experimentalist.—Ed.

COSTS Go DOWN UP Goes PRODUCTION with

OLIVER ACE
Universal Tool and Cutter Grinders

Simple to set up, easy to operate, the OLIVER ACE handles a wider range of cutters than do ordinary cutter grinders, yet requires no computation. With the ACE, time lags are cut to the bone . . . the simplicity of design and operation make economy of motion and fast grinding certain. The time-proved, soundly engineered Oliver ACE effects economies in floor space and less outlay in dollars for this truly superior type machine.

Direct Reading for Clearance
—Reduces Fatigue
—Eases Operators' Jobs

Especially qualified for grinding tungsten-carbide and high speed milling cutters and tools, the Oliver ACE has only one sliding part with ample bearing, efficiently protected from dust. Only two simple fixtures are required for a general range of cutters. Quick, accurate and easy . . . the ACE is maintaining its long-standing reputation in thousands of plants for doing the job for which it is built.

Priced to meet your budget, the ACE excels for grinding face mills up to 15"—also, slab mills • slitting saws • dovetail cutters • angular cutters • double angle cutters • Fellows helical cutters • reamers • taper reamers • production gashing and carbide tipped circular saws

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MACHINE TOOLS by OLIVER include:
AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS
DRILL POINT THINNERS
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the name Starrett® means precision here

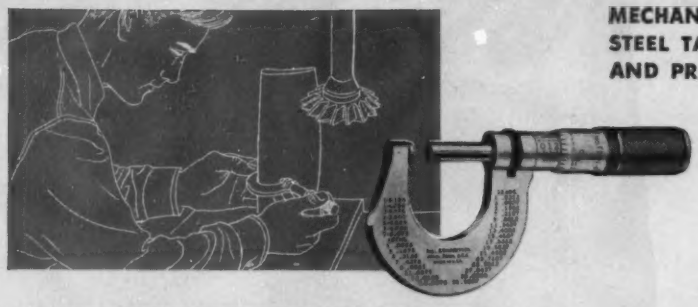
Just as you do for precision measuring tools, make the name STARRETT your "buy" word for dial indicators, hacksaws, band saws, band knives and precision ground flat stock. You get the same high standard of quality . . . the same precision manufacture . . . the same superior performance and reliability. You also get prompt, dependable, quality service when you specify STARRETT because the complete Starrett line is always available through a convenient and reliable source of supply — your local industrial distributor.

QUALITY DISTRIBUTION

Through Industrial Distributors is a plus value that adds *economy* and *prompt service* to the *dependable quality* of all Starrett Tools.

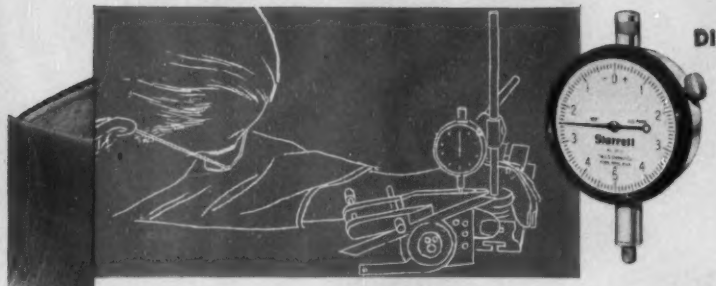
WHEN YOU MEAN PRECISION YOU SAY STARRETT

it means value and dependability here



MECHANIC'S HAND MEASURING TOOLS
STEEL TAPES, STEEL RULES
AND PRECISION INSTRUMENTS

The name Starrett on tools is the hallmark of precision — a guarantee of accuracy, fine workmanship and complete dependability.



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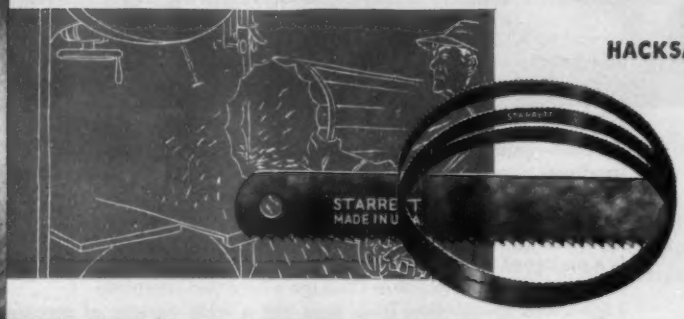
Standard for quality and precision — a complete line for every gaging or production inspection application.



HACKSAWS, BAND SAWS AND BAND KNIVES

Precision made by the World's Greatest Toolmakers for top performance, uniformity and maximum cutting economy.

PRECISION GROUND FLAT STOCK

Made in four types, 295 sizes — air, oil, oil or water, and water hardening. Look for STARRETT, the mark of precision, on every piece.

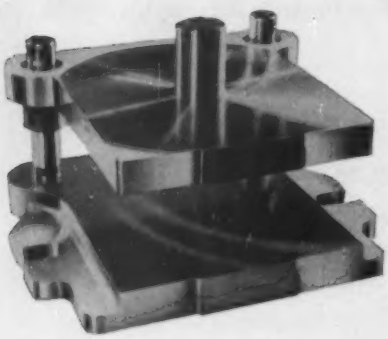
INDUSTRIAL DISTRIBUTOR

Starrett®

SINCE 1880
WORLD'S GREATEST TOOLMAKERS

THE L. S. STARRETT COMPANY
ATHOL, MASSACHUSETTS, U.S.A.

Fastest die set service ever



. . . made possible by Danly's unique mass-production and distribution system.

At the main Danly plant . . . high-speed precision drilling. Interchangeable fixtures accurately locate the full range of standard die set sizes.

At your Danly Branch plant . . . shipping die sets to your order. Up-to-date procedures and facilities assure fastest delivery.

To make your tooling program move faster, Danly mass produces interchangeable, precision die set parts . . . stocks them at your local Danly Branch ready for quick assembly to your order and delivery to you. With Danly, from the time you place your order until the set is delivered to you is a matter of only a few days. This extra fast delivery starts at the main Danly plant in Chicago where two complete high-speed production lines turn out a wide variety of precision die set parts. Held in ample stock by your local Danly Branch, these interchangeable parts are assembled to your order and delivered immediately. Don't let lagging die set delivery bog down *your* tooling program. Order from your Danly Branch and get the fastest service . . . ever.

Fast, nationwide delivery from these branch plants

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 South Laramie Avenue
Chicago 50, Illinois

Spot News of Metalworking...

- **MILAN FAIR...**
  After some pretty extreme innovations in past years, it looks like European machine tool designers are settling down. Although pushbutton controls were much in evidence at the Fourth European Machine Tool Exhibition, new machines displayed were less complex, more restrained in design. See p186.

- **EAST GERMAN TRANSFER UNIT...**
  Center attraction in the East German machine tool hall at the Leipzig Fair was a 14-station transfer line that performs 120 milling, drilling, boring and tapping operations on half of a motorcycle engine case. Lines similar to this one, made up of 25 basic boring units, are for export sale. See p192.

- **MILLING AND GRINDING DIRECT FROM DRAWINGS...**
  Direct-from-drawing contour milling and grinding to close limits can be done on a new Swiss machine. Spark-contact follower traces scaled-up drawing made with electrically conductive ink on dimensionally stable material. Grinding errors which might result from wheel wear are avoided by using belt-grinding attachment.

- **AUTOMATIC FOUNDRY...**
  One 2½-lb gray iron casting comes off a completely automatic foundry line every second at Eberhard Mfg Co, Cleveland. Only six watchmen are required to man the $600,000 closed circuit system developed by Osborn Mfg Co. Manpower savings are estimated at $300,000 a year.

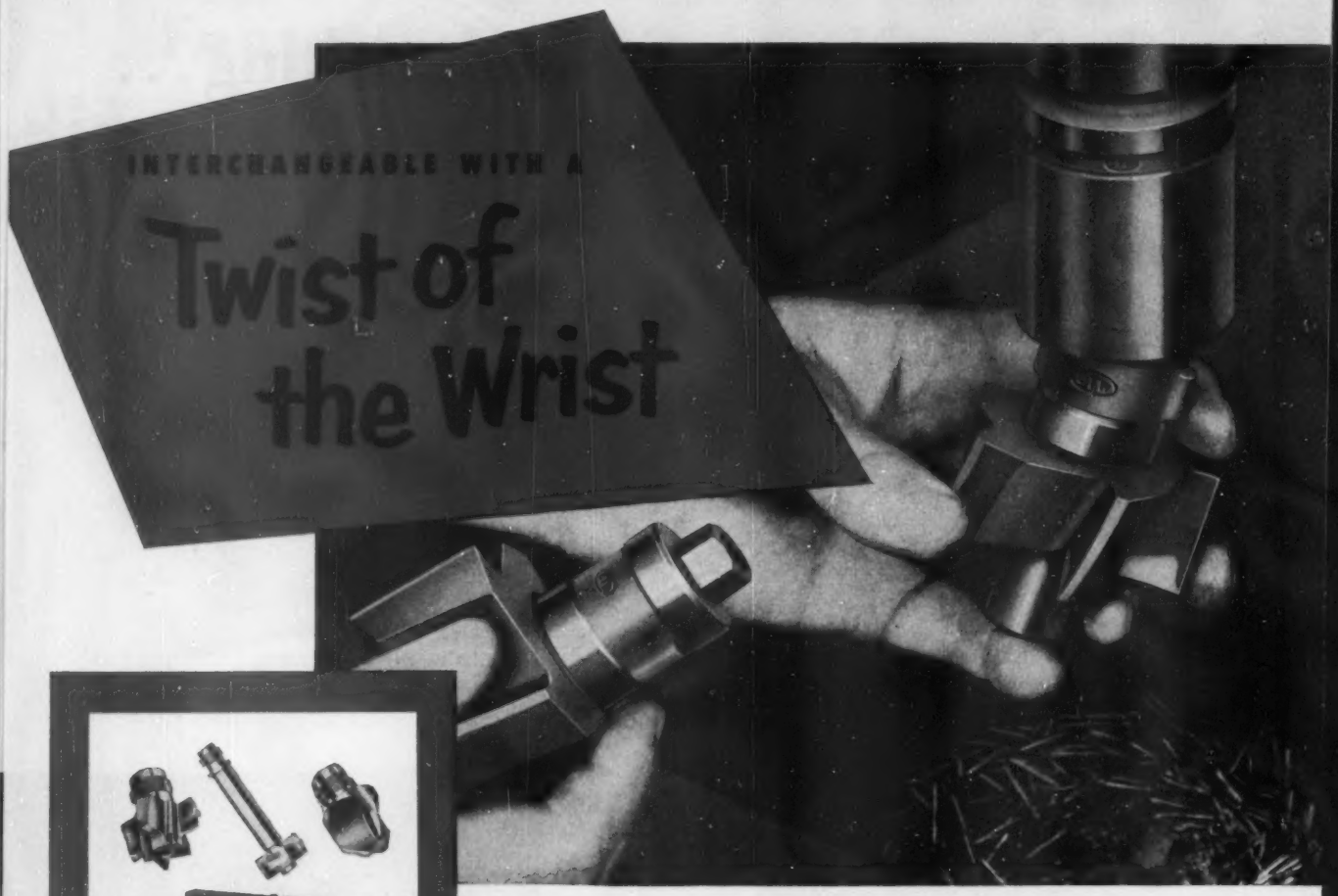
- **HOUSE OF AUTOMATION...**
  Sahlin Engineering Co's new Birmingham, Mich, plant will make experimental work transfer machines for automated press lines. These units will be used in conjunction with Sahlin's Iron Hand unloaders to take a stamping from the unloader, turn it over and move it to the next press. This could mean an approach to standardization in this field.

- **PRECISION ALIGNMENT METHOD...**
  Navy has developed a technique to maintain alignment of waveguide hardware and other precision equipment by using sodium chloride for bushings and spacers during soldering. Chemically pure sodium chloride is easily compressed into desired shapes, has a melting point of 804 C, is readily dissolved in water for ease of removal from assembly.

- **TITANIUM TANKS?...**
  Battelle Memorial Institute, Columbus, is doing research for the Ordnance Dept on using titanium for armor plate to cut tank weight.

- **AIR FORCE MACHINES...**
  The Air Force will mothball 110,000 of its present 120,000 production machines at termination of present contracts. Tools will be stored either near present users' plants or in government warehouses.

CONTINENTAL COUNTERBORES



Continental Counterbores may be purchased individually or in sets. Selection of three sets available. Write for new Counterbore Catalog.

THESE FEATURES WILL SAVE YOU TIME AND SAVE YOUR TOOLS:

Hand Detachable—one quarter turn by hand, ***a twist of the wrist*** engages or releases cutter.

Balanced Drive—*double* lugs on cutter engage *double* abutments in holder; *double* aligning bearings for rigidity.

Extra Torsional Rigidity—drive lugs are close to seating shoulder of cutter.

Practically Indestructible—driving forces apply compression, not shearing action.

Right or Left Hand—one quarter turn locks or releases either right- or left-hand cutters.

Outside of Holder Free from Obstructions—obtainable for piloting in bushing, fluted to remove chips or threaded for stop nuts or collars.

The Continental Drive is available in standard counterbores, spot facers, countersinks, and also on special tools such as multiple-diameter cutters, step counterbores, radius and chamfering applications. It is equally applicable for inverted operations. Order through your Ex-Cell-O representative or direct from Continental Tool Works in Detroit.

Other Continental Products: Standard and Special Cutting Tools, Broaches and Broach Fixtures.

CONTINENTAL TOOL WORKS
Division of Ex-Cell-O Corporation, Detroit 32, Michigan

54-28

Washington . . .

General Motors' share of defense contracts is up on the political front burner again. And with the prospect that the Democrats could take over one house of Congress, if not both, there's also the prospect of a continuing furor over who gets how much of the Defense Department's billions of contracts for hard goods.

Democrat Senator Jackson spread out Defense Department figures showing that GM received $1.7-billion in net new contracts during the first 18 months of the Eisenhower administration—that is, new contracts after subtracting contract cancellations during the same period. Compared with General Motors' record, the figures show that net new contracts to all other auto makers combined showed a decline—cancellations exceeded new contracts by $395-million.

Secretary of Defense Wilson defended the procurement pattern, saying that the awards to GM during the first 18 months of his regime resulted from letters of intent and other commitments actually made during the Truman administration. Actually, it's no secret that under both Truman and Eisenhower, GM has been 'way ahead of any other defense contractor in total defense business. The explanation is fairly simple: GM has more facilities, a greater variety of productive facilities, and the engineering and management talent to compete and get contracts in just about every industry that supplies the military: ships, planes, tanks, guns, engines, trucks, and what have you.

You can't prove anything, of course, but there's more than coincidence in the Army's award of contracts for tanks and other combat vehicles right after Jackson's blast. Out of $266-millions worth of business, Chrysler got the big plum: the $160.6-million contract for M-48 Patton tanks to be built in Chrysler's Newark, Del, plant. Chrysler underbid GM by $7.6-million.

GM's share of the $266-million will be about $47-million, for gun carriers to be built by the Cadillac Division, and the M-76 amphibious cargo-carrier to be built by the Pontiac.

How the auto makers fared during the fiscal year beginning July 1953—when the Eisenhower administration began applying its "new look" decisions—is shown by these Defense Department figures on net new contracts for 1954.

GM	$106.3-million
Chrysler	349.7-million
Studebaker	101.6-million
Packard	100.9-million
Ford	19.5-million
Kaiser	5.0-million
American Motors plus	15.4-million
Total all contracts	$618.6-million

Regardless of politics, the drouth of contracting is over. The Eisenhower-Wilson team is going to place contracts during the next nine months which will bring this year's total up to the $16-$18-billion level. This will be spread judiciously among suppliers. It's to go for aircraft, tanks, missiles, ships, submarines—right across the board. There'll be no more money for tanks, armored vehicles, and the like, though. All the orders have now been placed according to Pentagon sources.

• • •

Chrysler Corporation's $23-million contract for producing the new "Redstone" guided missile breaks through a bottleneck in missiles—it's a production contract for a hitherto-secret ground-to-ground guided missile. Redstone is an artillery-type, rocket-powered projectile-type missile, rather than a winged ground-to-ground missile like Martin's Matador pilot-less bomber now in use by United States troops in Germany.

• • •

Redstone is about the same size as the WAC Corporal rocket, but more powerful, and it probably has a range of well over one hundred miles. It will carry an atomic war-head, and is our first long-range guided artillery to be ready for production. Defense Dept will be announcing several production contracts for new missiles of varying types between now and the first of the year. Chances are that aircraft makers, rather than auto manufacturers, will be getting the next contracts for missiles.

• • •

Commerce Department is advocating application of the antitrust laws to labor unions. The revival of this years-old controversy arises from an Eisenhower committee studying an all-out revision of all antitrust laws.

Commerce officials cite specific practices that they say can't be reached under the Taft-Hartley Law, including union-imposed make-work restrictions—typesetters blocking use of automatic tapes, pipefitters banning work on plastic pipe, many rules of the building trades against handling certain kinds of materials that are time and labor-saving.

• • •

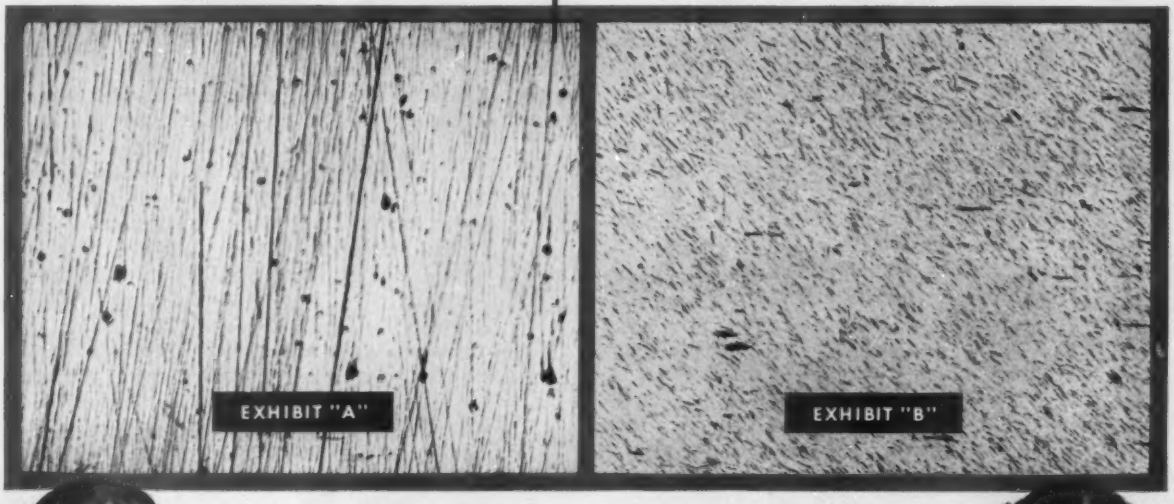
Labor Secretary Mitchell is fighting any change from labor's present exemption from the antitrust laws. Odds favor no change, since that would also call for removing other antitrust exemptions including those given to manufacturers and retailers under the Fair Trade Laws, exporters under the Webb-Pomerene Act, and farmers under the Agricultural Marketing laws.

LITTLE KNOWN FACTS

about the NATURE of GAGES

Scientific research has brought to light facts about *Fixed Size Gages* that will benefit all of us who come into close contact with them—especially those who pay good money for them.

The two illustrations "Exhibit A" and "Exhibit B" are unretouched photomicrographs of lapped gage surfaces straight from The Detroit Testing Laboratory, Magnification X100 in both cases—Project 4726-C-12.



COMPLEXION—Harsh or Lovely

Notice the deep lines and wrinkles that characterize "Exhibit A." A definite indication of improper "Skin-Care."

Contrast that with the smooth even texture and youthful appearance of "Exhibit B." A skin that invites your touch.

Both gages are the same age and neither had ever been used at the time they were photographed. No favoritism whatever.

CONCLUSION

The ridges between the furrows in "A" will wear down quickly when that gage is put into service. Result: Rapid initial wear—Short accurate life—High cost per part gaged.

"B" is a SHEFFIELD GAGE, painstakingly finished by Master Craftsmen using an exclusive Sheffield lapping process.

It is perfectly obvious that the Sheffield Gage will have a longer, accurate life and lower cost per piece gaged.

Gage Division—The Sheffield Corporation
Dayton 1, Ohio, U.S.A.

Something to Think About!

6808

MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

Detroit . . .

In the years directly ahead, more intense sales competition among automakers is sure to show up clearly in the sales volume totals and backlogs of machine tool builders, die shops, other segments of the metalworking industry whose business hinges importantly on autodom.

While the striving of automakers to pare costs has been uncomfortably apparent to all suppliers, that same competition is forcing auto companies to make more pronounced and noticeable changes from model to model. More frequent and extensive styling and engineering alterations require larger tooling outlays, of course.

An early look at a few of the 1955 car models reveals that at least in some cases, the trade term, "facelift," no longer applies. Some 1955 products are tangible evidence that automakers recognize that they cannot sell the same styling, engine and engineering features for three or four years and expect to hold or improve their sales positions.

In other years since World War II, companies could simply rearrange the chrome on a car, gimmick the front end, occasionally alter the overall lines, then produce all the cars possible because the public would buy same, albeit the current model might be indistinguishable from old models in appearance and performance.

That won't hold now, as several—but not all—automakers will demonstrate when they trot out their '55 fashions. One producer, for instance, made very extensive and expensive changes in 1954 models. In the period 1946-1953, the company could have expected to get at least three years' mileage out of its investment for the current models. Pent-up demand virtually guaranteed sales then.

But this company's management obviously felt a rehashed version of its very popular present model would not do for 1955. One result: the upcoming new model reflects as many, if actually not more, styling and engineering changes than the '54 model did. Another result: the investment in new tooling for the '55 line runs nearly to $40-million.

Significantly, a body engineer pointed out: "If you think this is a surprising change, wait'll you see what management is making us do for 1956!"

There are other signs that automakers intend to spend enormous sums of money in order to run well against competitors. For instance: an automaker who introduced a spanking new engine less than 36 months ago is a good bet to release another new engine program by mid-1955. New transmission developments are apt to come along thick and fast, spurred by soon-to-be-announced advancements at Packard, Buick and Lincoln. New suspension designs will necessitate retooling. Should Packard's torsion bar suspension win wide acceptance, other companies can be counted on to follow.

Late in the year, two, possibly three, companies will introduce production models of four-door hardtop sedans. Rather ecstatic sales officials believe these uniquely styled models will make at least as big a market splash as the two-door hardtop did when introduced five years ago. If competitors decide to copy the styling, as they certainly will, large expenditures for new body dies will be required.

• • •

A not uncommon remark heard often in supplier circles over the past year has been, in effect: "those unmentionable auto companies have squeezed every last dime out of suppliers' margins, then don't even pass the saving along to the fellow who buys a new car. . . ."

There may be more than a grain of truth in that. But it would also seem that automakers will have to push huge sums of money back to suppliers, particularly the tool and die industry, if auto sales positions are to be maintained.

• • •

Watch for word from one of the auto companies to the effect that it has overcome another obstacle to development of gas turbines for autos.

The company is readying an announcement that will say its engineers have developed a turbine which can be built of conventional and abundant metals such as steel.

Previous announcements by other companies have pointed out that metallurgical problems would retard practical application of gas turbines to autos for some years to come. Bulk of the materials needed to produce previously announced turbines are on the critical list.

Moreover, this company will claim that unique heat exchanger characteristics of its turbine make future application of atomic power feasible.

The company will build and install in autos several of its turbine prototypes, but will announce no plans at all for volume production. Reason: the company is convinced that even if it were to make turbine-powered autos available, the public would not be prepared to accept them as practical.

• • •

To prove the durability of its new V-8, an auto company will soon start a '55 model off on a 25,000-mile speed run at its proving ground.

Plan is to have the car register a sustained speed in excess of 100-mph for the entire 25,000 miles, without giving the engine any more than routine servicing.

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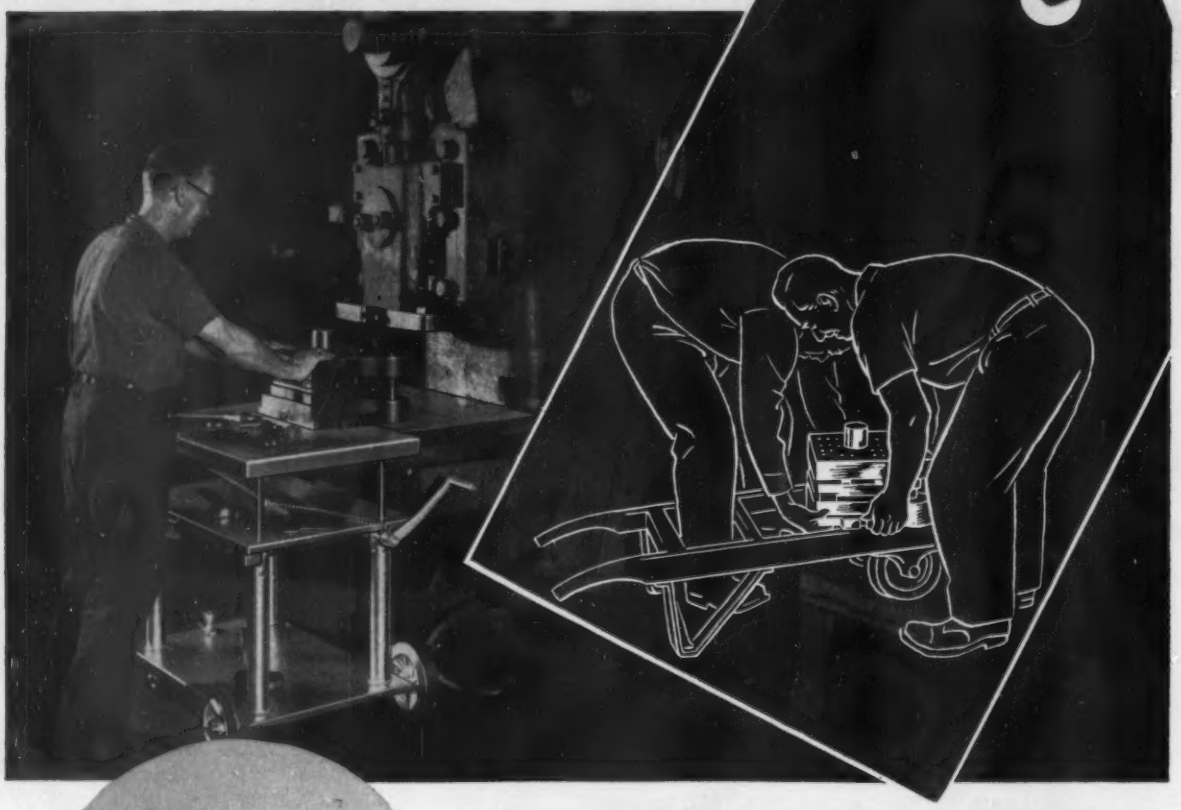
540-4



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Prices start at $155.00—Install a couple without delay, and watch results.

Machine Tools . . .

Fourth European Machine Tool Exhibition at Milan turned out to be quite a "sleeper"—it had more exhibits than Brussels (1953) and Hanover (1952).

In fact, the 10-day Milan Fair, which closed its doors September 23, while it didn't set any records for attendance was the biggest and best European machine tool show to date (see p186.)

• • •

The Leipzig Fair, too, created a lot of interest and participation on the part of Western nations—particularly West German machine builders, steelmakers and coal people—who attended in spite of official frowns from Dr Adenauer.

Some 1100 West German firms exhibited, compared with 621 last year. Reason: the West Germans have their eye on Russian and Chinese markets, and at Leipzig they have a chance to meet trading authorities of those countries.

The British were at Leipzig in force, too, with 80 exhibitors this year, against a dozen or so in 1953. But only two British machine-tool builders had stands at the Fair, and neither had machines on display.

The British had a collective exhibition at Leipzig that was the first port of call for the Chinese Trading Mission on its official tour.

East German machine tools on display included: multi-spindle automatics, lapping and honing machines, a two-spindle gear shaver, optical profile grinders, and a double-wheel lapper.

Russia showed only a dozen or so machine tools this year including: a 65-mm, six-spindle bar automatic, a rail-mounted radial drill, a 3000-rpm max speed lathe; a rack profile gear grinder. The Russians are said to be experimenting with large planers that cut in both directions.

A score or so of Chinese-built machine tools on display at Leipzig were all exact copies of Soviet models, and were mostly standard machine types. Reason: Chinese machine tools are produced directly from Russian drawings.

Czechoslovakia had 350 tons of machine tools on display, with emphasis on heavier types.

Poland showed an impressive array of machines, including a large taper roll grinder, a roll-turning lathe for steel mill rolls, a large vertical boring mill, and a hydro-copying lathe.

• • •

Vance Plan funds have now been allocated to the various services, but no details are out yet.

Money will be allocated for tools to build at least one known end item—the F-100 North American Super Sabre jet.

Allocation of Vance Plan money should settle the Air Force's long-standing hassle with the other services as to how the funds should be spent.

Air Force has been plugging elephant machine tools and giant presses, some of them of a highly experimental nature.

Other services want to buy general-purpose tools. And even here there is a conflict-within-a-conflict. One group wants to buy longest lead-time tools, regardless of the package for which they are intended. Another wants to buy full tool packages for production of a specific end-item, regardless of lead-time.

Still another Vance Plan spending controversy: some groups want to buy general-purpose tools now, special tools later. Others—vice versa

• • •

Despite some recent leasing of government machine tools for civilian purposes, the Defense Dept is still banning wholesale leasing.

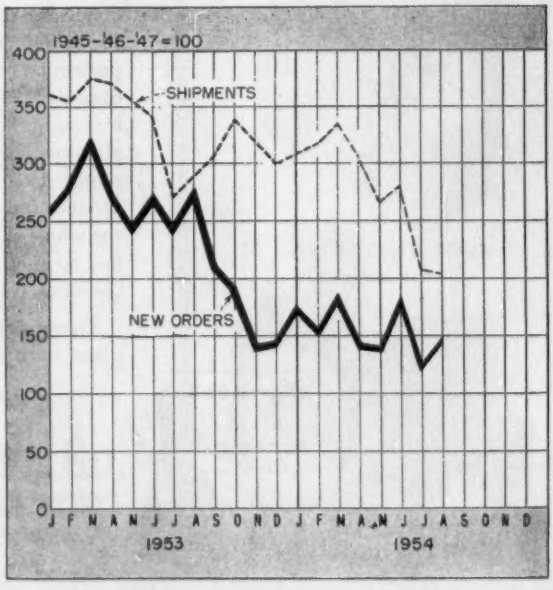
In other words, cases like the recent Highway Trailer leasing deal (AM Sept 27, p103) are not bellwethers, and will have no effect on future leasing decisions.

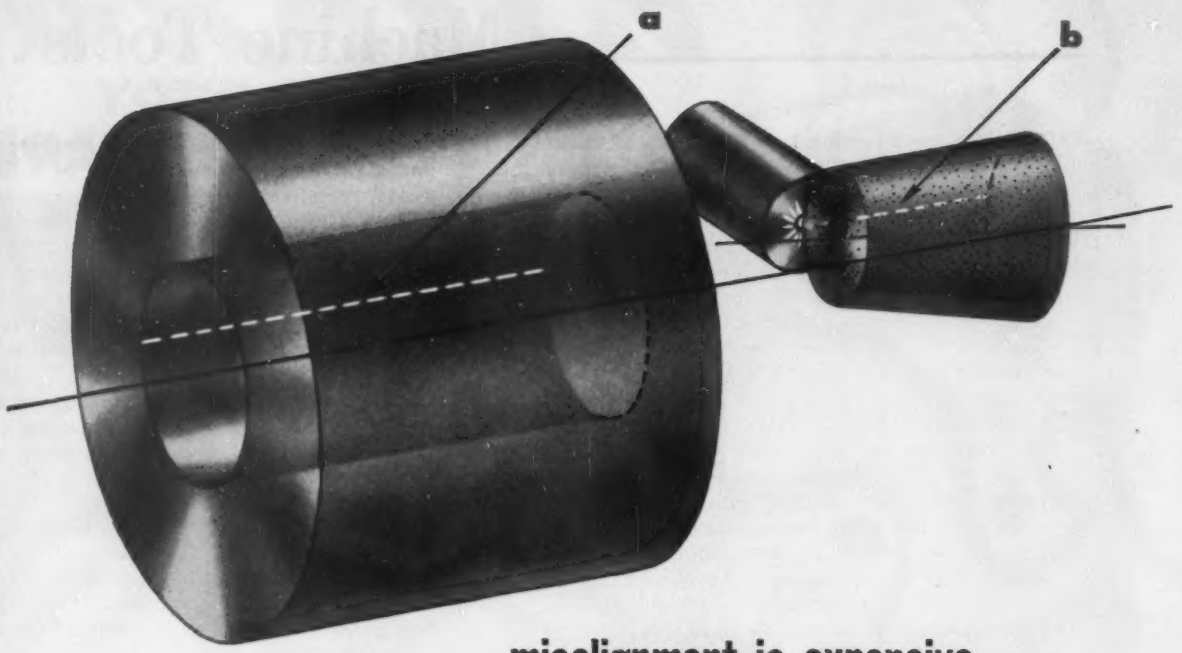
In Highway Trailer's case, the firm is the sole supplier of post-hole digging vehicles for the Army Signal Corps and for telephone and electric utility companies. As such it is vital to the mobilization base.

Not only that, the Army claims cost of transporting the tools to distant US warehouses would be prohibitive, and could irreparably damage delicate tool parts.

MACHINE TOOL INDEX
(1945-47 = 100)

(Source: National Machine Tool Builders' Assn.)





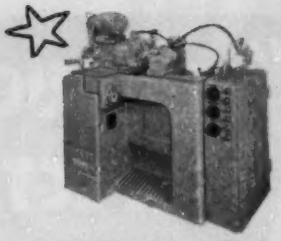
misalignment is expensive

...Bryant controlled alignment

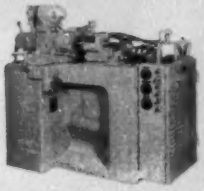
GRINDING a straight hole on an internal grinder is normally done with a straight (cylindrical) wheel. It is sometimes desirable to turn the wheelhead and dress the wheel to a taper in order to use a more rigid projection. However, this setup presents some serious obstacles which cannot be overcome unless they are clearly understood. In order to grind a straight hole the various elements of the machine must be in perfect alignment. The degree of alignment will be determined by the accuracy required on the finished part. A machine may be lined up sufficiently to produce holes within tolerance when grinding with a straight wheel, but if the wheel is turned and dressed to a taper, the alignment problem is magnified to such an extent that it may be impossible to produce holes within the same tolerance.

The center lines of the wheel, work and diamond must be in a common plane so that the wheel contacts the work at line "a". If the tapered wheel

Write for "Alignment" booklet which gives complete details on this interesting subject. Also ask for booking form on new sound, color movie—free showings arranged for engineering groups.

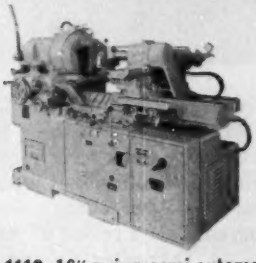


no. 1109 9" swing, semi-automatic

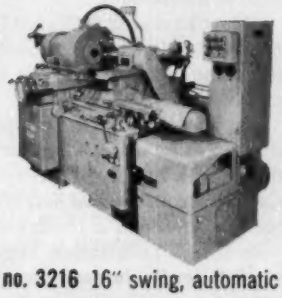


no. 1309-W 9" swing, 2 spindle semi-automatic

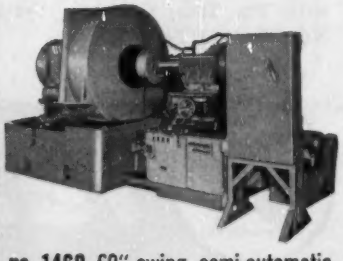
no. 2209 9" swing, automatic



no. 1116 16" swing, semi-automatic



no. 3216 16" swing, automatic



no. 1460 60" swing, semi-automatic

The Bryant 1109 Precision Internal Grinder is a semi-automatic machine, designed especially for grinding small bores. Although intended primarily for bore diameters of less than 1", it has a chuck swing of 9" and a maximum grinding stroke of 3½". By using preloaded ball bearing slide bars for both cross and longitudinal slide movements, sensitivity is obtained without loss of rigidity. These rigid slides transmit the operating load directly to the base of the machine. The Bryant Hi-Frequency Wheelhead, providing speeds up to 100,000 R.P.M., is furnished as standard equipment to assure efficient surface speeds on the wheels necessary for grinding small bores. Write for further information.

gives better internal grinding

contacts the work above or below line "a" the wheel will touch only at its largest diameter and, as the wheel reverses (at the left end of the hole), it will transfer its taper to the work resulting in a tight hole at the back. Turning the workhead or changing the length of traverse cannot overcome this error. Further, because of poor contact, wheel wear will be excessive and finish poor.

If the diamond is set either above or below line "b" (which is a continuation of "a") the wheel will be dressed to a curve (hyperbola) and even if the wheel contacts the work at line "a" it will be only a point contact. Again, the wheel form will be transferred to the work at the point of reversal, wheel wear will be excessive and finish poor. The proper setup calls for the work axis, wheel axis and diamond to be in a plane parallel to the longitudinal and cross motion of the machine.

see our catalog in MACHINE TOOL CATALOGS or write for copy

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—says
M. A. Enright, Vice President, Nelson Stud Welding Division, Gregory Industries, Inc., Lorain, Ohio.

SEMI-AUTOMATIC NELWELD gun developed for controlled welding of flux-filled studs helps cut costs in every metal using field. Studs produced in many shapes and sizes are used to hang, hold and handle.

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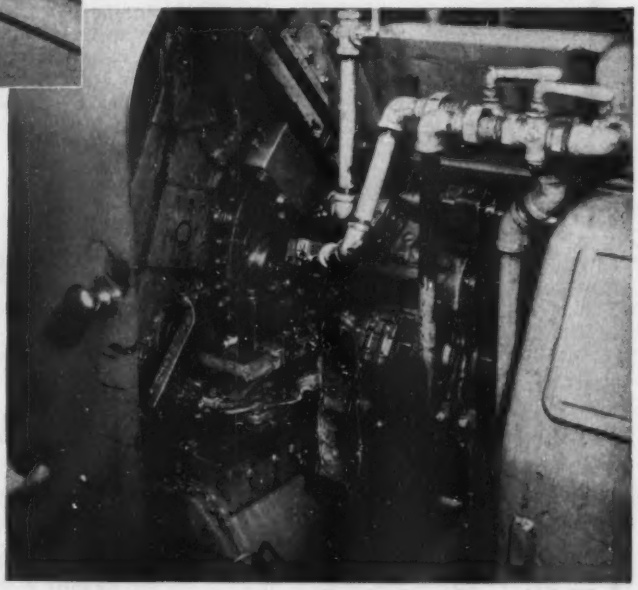
"Since changing to *Texaco Transultex Cutting Oil,* our production has increased beyond our expectations, and maintenance costs have been substantially reduced."

The above experience is typical. Whatever the machining to be done, whatever the machines used or the metal to be cut, there is a complete line of *Texaco Cutting, Grinding and Soluble Oils* to help you do it better, faster, and at lower cost.

A Texaco Lubrication Engineer will gladly give you full details. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.



NELSON USES a battery of National Acme multiple spindle automatics, Brown & Sharpe single spindle automatics, and many Nelson Vertical single spindle automatics for threading and boring its end welding studs. Various kinds of stainless and 1015 to 1020 steels are used. Coolant is *Texaco Transultex Cutting Oil.* Machine lubricant is *Texaco Cleartex Oil.*

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Gaging Metalworking . . .

PRODUCTION INDEX

BASED ON MANHOURS WORKED IN THE FIVE COMPONENTS

	SEPT '54(*)	AUG '54(p)	JULY '54(r)	AUG '53
Tot. Index...	**147**	**148**	**148**	**171**
Machinery	**128**	**126**	**145**	
Electrical Machinery	**180**	**173**	**203**	
Autos	**98**	**100**	**125**	
Other Transportation	**285**	**290**	**307**	
Other Metalworking	**126**	**126**	**144**	

(*) Estimated (p) preliminary (r) revised

General tone of optimism is evident throughout Metalworking these days, even though the fall pickup in most branches of the industry hasn't really started to roll yet.

The auto parts makers are just getting under way on work for the new models. Practically all of them are loaded with orders.

Aviation parts people hit capacity production around the end of September. And most of them have a backlog of new orders that will carry them well into next year.

• • •

Steel operations are picking up. One major area reports 70% of capacity, with general orders from all types of metalworking plants holding up well.

Detroit orders are just starting to pour in, and by the end of the fourth quarter operations are expected to reach 73-75% of capacity and stay there through the winter.

Increase in orders for stainless as well as bar stock and sheet is noticeable. Wire products are doing a brisk business.

• • •

The big metalworking shops generally are operating at capacity. Not so the small custom metalworking shops. A lot of them are on short work weeks and one-shift operation with nothing much in sight in the way of more business. One reason for this is that the big operators are farming out less and less work, and the small shops are feeling the pinch.

• • •

One midwest carbide cutting tool manufacturer reports that up until mid-August its sales were running 50% under 1953 levels.

The picture has changed fast since then. Now the company reports a rapid climb in new orders, which are now at a "very good" level.

But, the company says, individual orders are much smaller than they were last year—a sure indication that tool users are still buying on an "as needed" basis—and they're not adding to inventories just yet.

Another cutting tool manufacturer reports some gains in new orders during the last month or so, and is looking for a slow but steady pickup in business from now on.

Their prediction: cutting tool sales for the fourth quarter will run 20% under those for 1953, but 10% ahead of the third quarter.

One production toolmaker reports the "usual fall pickup," but says volume to date is not nearly as great as expected. This firm's sales for the first six months were 20% less than for the same period last year.

Sales will do well to hold at present levels through the rest of this year, but the company hopes to do 10% better next year.

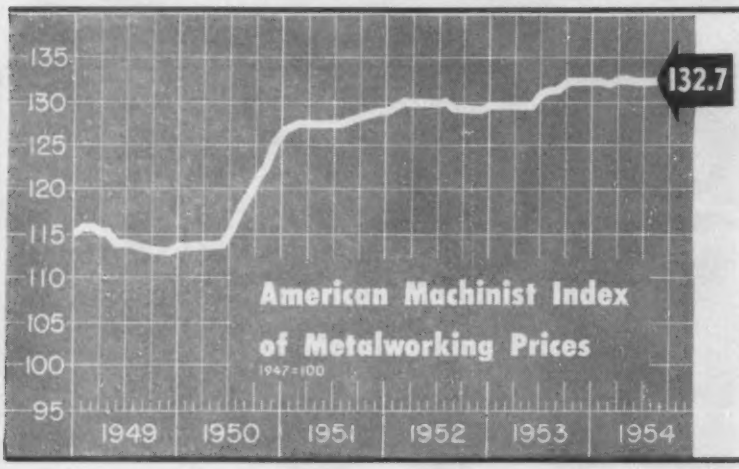
Current sales are coming from makers of special machine tools and auto plants who are retooling for '55 models. Makers of standard machine tools aren't at all active.

• • •

Tool and die volume is increasing again after a mid-Summer drop off to 82% of July 1953's total. New orders were off 8% for July as against June: employment was off 1%, according to latest available figures.

But tool and die men feel the worst of 1954 is over, and they're looking forward to a substantial pickup over the balance of the year.

Gaging Business . . .



PRICE INDEX

	SEPT '54(*)	AUG '54(p)	JULY '54(r)	AUG '53
Total Index	**132.7**	**132.6**	**132.4**	**132.1**
Metalworking Machinery	**141.6**	**141.6**	**140.9**	
Other Machinery exc. Electrical	**137.4**	**137.3**	**136.4**	
Electrical Machinery	**131.0**	**131.0**	**130.7**	
Fabricated Metal Products	**129.9**	**128.7**	**128.8**	

(*) Estimated (p) preliminary (r) revised

General business activity is expected to continue relatively stable over the rest of the year. If anything, the averages should inch up over the next few months.

But behind this stable front of mild recovery, some important changes are taking place.

Take appliances, for example. That industry has been going great guns in recent months, but is expected to slow down considerably by year's end. Reason: radio and TV sets must be in dealers' hands by the end of November for Christmas business. After that, output will drop off sharply.

Steel, on the other hand, will rise in output. By year's end, that industry will probably be operating at about 75% of capacity—a 6% increase that can be chalked up to a build-up in inventories.

• • •

Textile output, depressed for more than a year, is due for a rapid recovery. Inventories will be built up soon at all distribution levels.

Shifts in industrial trends, such as the decline in machine tool new orders and the slow pickup of automotive parts orders, add up to more unemployment in Cleveland and Cincinnati, less in Cleveland and New England (textiles).

While unemployment figures haven't changed much since May, behind-the-scenes figures are changing—with one industry up today and down tomorrow, and others vice versa.

Factory employment totaled 15.9 million in August, representing an increase of 240,000 workers over July. But little of this increase occurred in durable goods manufacturing. The electrical machinery industry was the only one to report substantial August gains.

• • •

Construction continues to hold up. August housing starts totaled 111,000 units.

Housing for the first nine months was about 900,000 units—4% more than a year ago.

Housing starts fell off in the cities in August, but increased in suburban areas.

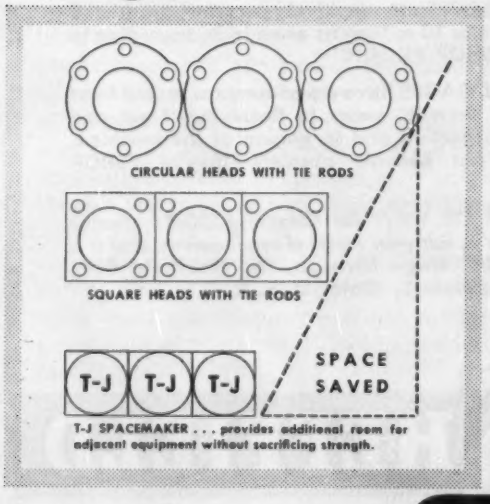
WEEKLY BUSINESS INDICATORS

	Latest Week	Preceding Week	Year Ago
Business Week Index of Activity (1947-49 = 100)*	121.3	121.2	132.0
Steel ingot production (thousand tons)	1,642	1,637	2,149
Electric power output (million Kilowatt hours)	9,072	9,074	8,354
Production of automobiles and trucks	71,017	74,026	140,953
Engineering construction awards (*Eng. News-Record,* millions)	$233.9	$340.9	$382.6

MONTHLY BUSINESS INDICATORS

	Latest Month	Preceding Month	Year Ago
Refrigerators sales (thousands of units)	325	303	330
Vacuum cleaner sales (thousands of units)	194	196	159
Washers sales (thousands of units)	243	303	228
Household electric ranges sales (thousands of units)	80	86	80
Radio production (thousands of units)	437	838	674
Television production (thousands of units)	307	544	316
Gear sales index (1947-49 = 100)	141.3	127.4	120.7
Foundry equipment new orders index (shipments, 1947-49 = 100)	68.8	86.4	158.9

* Seasonally adjusted



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More plus features include—heavy wall, precision honed, hard chrome plated, seamless steel body . . . leakproof cylinder head to body construction . . . heavy duty, high-tensile, *hard chrome plated piston rod.* Write for bulletin SM-454-2. The Tomkins-Johnson Co., Jackson, Mich.

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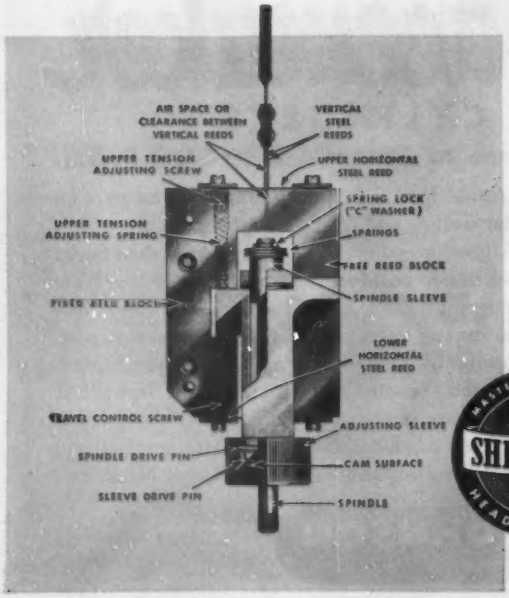

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VISUAL GAGES are rugged and sturdy. Repeated tests of 100,000,000 gaging operations have shown no wear on the Reed Mechanism. It is the simplest, most positive and most inherently accurate magnifying mechanism for precision measuring ever built. "SHOP PROOF!"

"Movement without friction"—that's the Reed Mechanism. There are no rubbing contacts, no gears or backlash. No knife edges to flatten or break, no lost motion. Electricity is used only for illumination—unaffected by voltage fluctuations—only a lamp bulb to replace at rare intervals. "SHOP PROOF!"

Yet VISUAL GAGES are sensitively accurate, graduated in 100, 50, 25 or 10 millionths of an inch, according to the model. "SHOP PROOF!"

Many VISUAL GAGES have a performance record from five to more than 20 years in Receiving, Final and Production Inspection and in gaging at the machine. They have not become obsolete—they're "SHOP PROOF!"

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MASTER CRAFTSMAN SHEFFIELD HEADQUARTERS

SHEFFIELD

American Machinist

MAGAZINE OF METALWORKING PRODUCTION • ESTABLISHED 1877

Invitation to Disaster

Not long ago a company of national fame permanently closed its main plant in an eastern city. It was a sad day for the company and its 2000 employees. The operation had once been the nation's largest factory of its kind and had been continuously active for more than 100 years.

There is no secret about why the plant's doors were locked forever. The factory had grown like Topsy. Buildings were antiquated. The layout was inefficient. Machinery was old and production costs high. The company was in a bad spot competitively and had to do something drastic to save itself.

A small town in the Deep South took a major part in the rescue act. It used the proceeds of a bond issue to build the company a brand-new small factory. The company's products could be made at much lower cost in this new plant equipped with up-to-date machinery than in the old one. Taxes were to be low, at least temporarily. The lure was irresistible.

This migration need not have happened, however. This was not a case of the economics of one part of the country being so overwhelmingly in its favor that another part of the country did not have a chance. It was not a case that could be charged up to the salesmanship of the officials of the southern community, though one must admire their enterprise.

The truth is that the bait held out gave the company management an escape from the dilemma that it had got itself into with its eyes open. And the dilemma had not suddenly appeared out of nowhere. It had been a long time forming.

The management was paying the penalty of obsolescence. By its own confession it had allowed old manufacturing techniques to continue long after they had been discarded by competitors. It had been negligent in refusing to make necessary capital outlays to keep its production machinery modern. It had not ploughed back profits to insure the future prosperity of the company. And as a result it had fallen upon evil days.

It would not have mattered where the plant was located, as long as such shortsighted and harmful management policies had prevailed. The same result could have been predicted, whether the factory was in Connecticut, Illinois or Alabama.

This is a fast-moving industrial age. And any company content to sit back and let nature take its course is in for deep trouble. New materials, new processes, new machines and new products are being developed with bewildering speed.

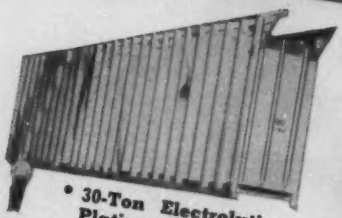
One of management's obligations, for survival if nothing more, is to keep pace with these developments. Above all, it cannot afford to get itself into the unenviable position of having its plant filled with machines designed and built in the 1920's and 1930's.

Neither can it afford to keep manufacturing techniques that necessitate the use of high-cost manpower instead of machine power and horsepower.

Obsolescence has no legitimate place today in the nation's metalworking plants or in any other industry. If management nurses obsolescence instead of getting rid of it, it is inviting the same kind of fate that befell the company just cited.

Burnham Finney

• Roll Tables for Steel Mill



• 30-Ton Electrolytic Plating Tank

• Control House for Steel Mill

• Automotive Products

• Miscellaneous Forming

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on a versatile, accurate

Cincinnati Press Brake

At Charles T. Brandt, Inc. speed, accuracy, and versatility are necessary to take care of large or small work in jobbing or production quantities.

Write for the New 72 Page Catalog B-4, describing operations, features, and special arrangements including wide beds and rams, bed and ram extensions, deeper gaps, higher die space and other features.

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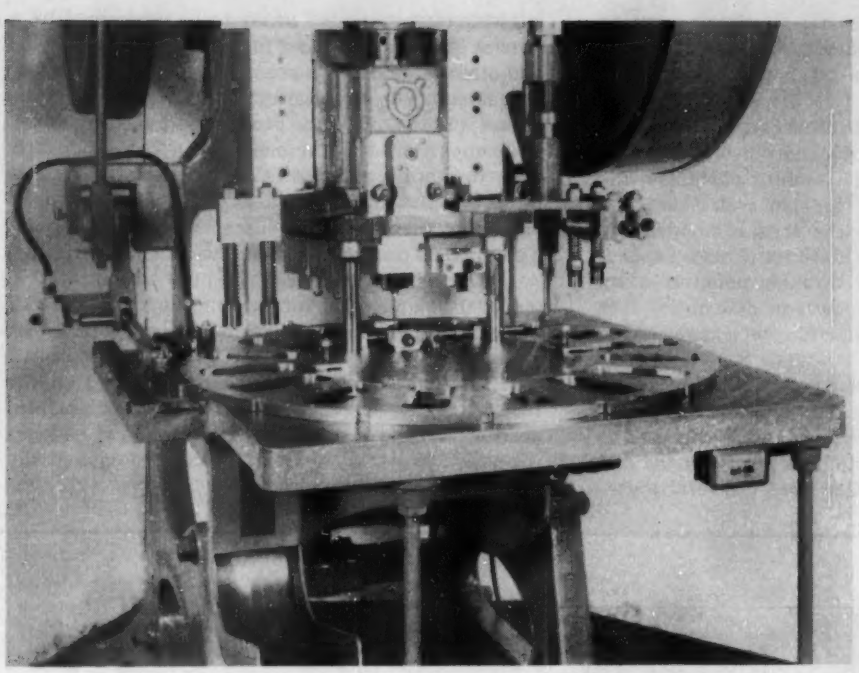
American Machinist



Two stamping companies tooled up to make a plastic-tape dispenser. One chose a 4-station progressive die: the other, a blanking press and a dial-feed forming press. After equipping the latter with a magazine feed, production reached 70 pc per min., and a lower over-all cost was realized

Good tooling plus dial feeds will cut stamping costs

Dial feeds on presses are the means for concentrating a number of second operations or assembly operations at one point, thereby saving labor and improving product quality. The tooling for dial feeds is the heart of the matter, and can be as ingenious as any that you are likely to find in pressed-metal shops

WILLIAM W SCHUG, V & O PRESS CO, DIV EMHART MFG CO

Dial feeds are engineered for specific mass-production jobs. The dial and the press are matched to work requirements, and special tooling is designed to suit the nature of the operations performed. In other words, you get a tailormade job, where the nature of the dial, the tooling, the built-in inspection devices, the press characteristics and capacity are all combined with one purpose in mind—maximum production rate consistent with product quality and characteristics.

The activity rate of a dial-feed press frequently makes it one of the fastest means of producing parts or assemblies. The press may operate at only 50 strokes per minute but much happens around the dial.

You can have several hoppers, chutes and magazines around the dial or over the dial to feed parts for a purely assembly operation. Or you can have hoppers feeding parts and a strip feed supplying material to make parts and assemble them with the fed parts. Or you can perform a whole series of second operations on a piece at a rate several times faster than hand loading at single-operation setups. In the last category, the savings in respect to operators, machines and floorspace are especially large.

Improvement in product quality and reduction in rejects are matters that should be considered. A hopper, chute or magazine must have accurate, clean parts to avoid jams in feeding. If trouble arises here, the emphasis is shifted to making better parts in the

Dial feeds . . . continued

original setups. Often this step discloses ways to make improvements and cut costs. The result is dial-produced assemblies with a fraction of one percent in rejects.

Dial-fed parts can and often should be self-inspected by the press. Electrical means incorporated in the tooling will search for lack of parts, for improperly positioned parts, for parts that are not level. If anything is wrong, the press is stopped immediately, so that valuable material is not scrapped, or defective work passes through undetected by operators or inspectors. On low-cost assemblies, it is important that inspection functions be transferred to the machine.

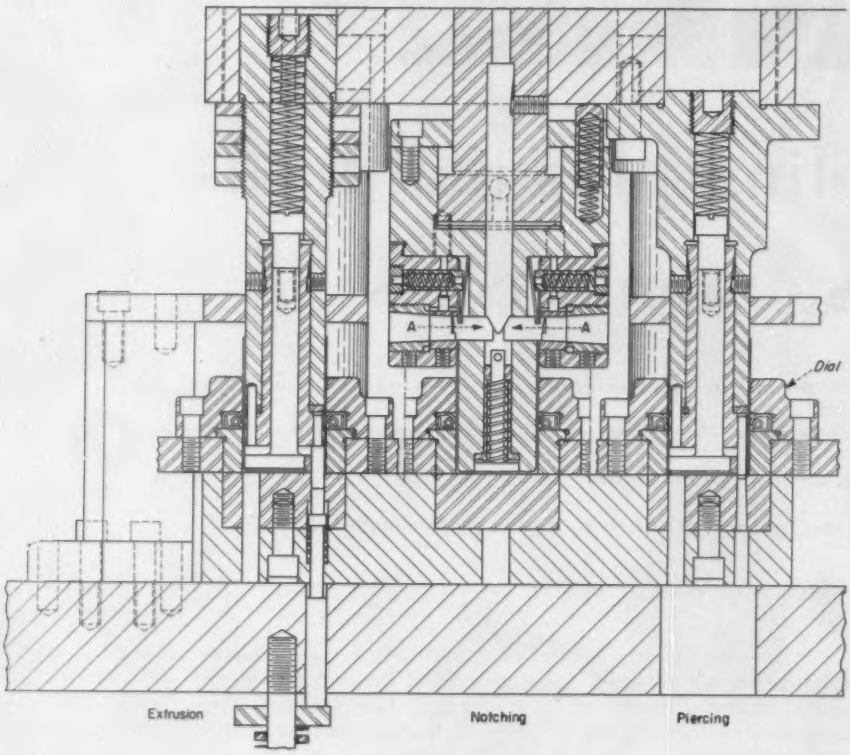
Thus, there is much more to a dial-feed press than the dial itself. The dial is a conveying means. It carries fixtures. For best results, work performed at tooling stations should not impose forces on the dial itself. Thus, you will find that one or several press-working operations are likely to be performed by a special die set and tooling in front of the press slide, and other dial positions are used for feeding parts or sub-assemblies. The dial merely moves through the die set, and die elements absorb the punch pressure.

When a dial is combined with a die set in this way, you get the effect of a progressive die or a transfer press, plus the advantages of being able to feed parts into the process at one or more points.

Dial feeds can be classified into five categories:

1. Ratchet driven. This type uses a reciprocating index slide and pawl for driving, and is registered by a cam-operated, positive lock pawl. This is the conventional, most common type of dial feed.

2. Friction driven. A reciprocating band on the forward stroke moves the dial and its index ring into position, so that a spring-backed stop pawl engages the index ring and holds it stationary against the return stroke of the index band.



Dieset and dial feed perform three operations on shell

▶ **Open end of 1½-in. OD by 2½-in. long shell has three notches cut by punches at *A*. The punches are operated by a cam assisted by flat and coil springs**

A dial and a dieset can be set up so that in effect you get a progressive die for second operations on a shell. In this case, a dieset with guide pins at the rear is employed. The dial moves over the die plate. The setup pierces seven holes in the bottom of the shell, cuts three notches in the top, or open end, and then eyelets or burrs the pierced holes. Production rate, 40 pc per min.

The part is fed by hand, open end up, into the dial and then pushed to the bottom of the dial with an inserting punch, not shown. At the first station, seven holes are pierced, and spring stripper leaves the shell seated in the dial. Furthermore, a friction device at all dial stations keeps the shell from turning.

At the second station, a pilot enters the shell, and with continued descent, three notching punches are actuated by a cam. Round-nose punches at the third station eyelet or burr the pierced holes. Finally, at another station, the piece is ejected through the dial.

3. Geneva-motion driven. This is a mechanism for producing positive intermittent motion from a continuous rotary drive. It requires no separate positioning arrangement.

4. Roller-gear driven. This is in effect a worm drive with a dwell in the lead of the worm, and in general is more versatile and smoother operating than the Geneva drive. Further, it is capable of operating at higher speeds.

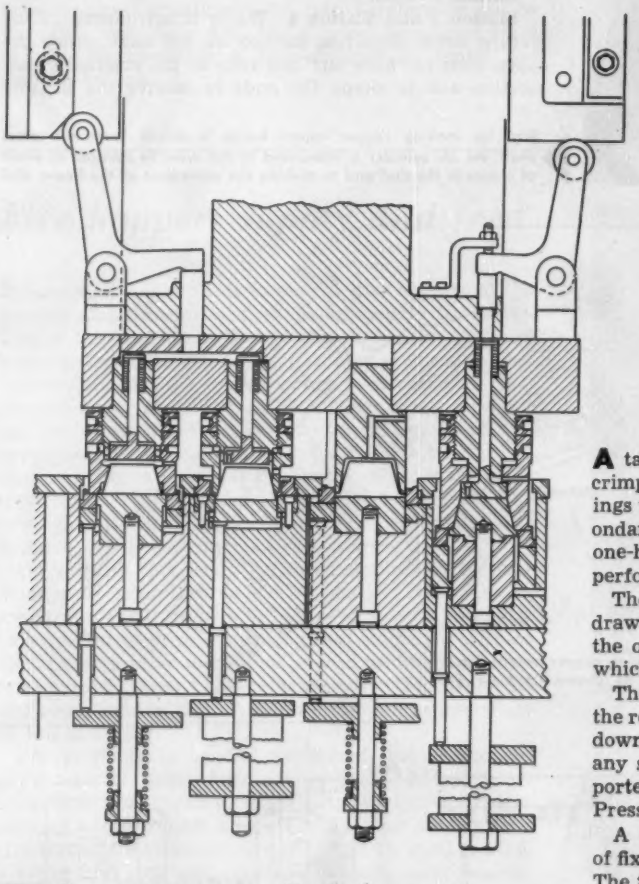
5. Air or hydraulic driven. This type is driven independently of the press.

The friction, Geneva, and roller-gear driven dials can be operated at higher speeds than the ratchet-driven type. The air or hydraulic drive is ordinarily used when the dial speed is quite low.

Where the nature of the work being performed requires it, tools can be carried by the dial. This involves a multiplicity of tools with its attendant cost and increased weight of the dial unit, and often requires such precise registration that force alignment of the dial is necessary. It is important that the dial be designed so that the working load on the tool be transmitted directly to the press frame to avoid distortion of the dial from repeated shock loads.

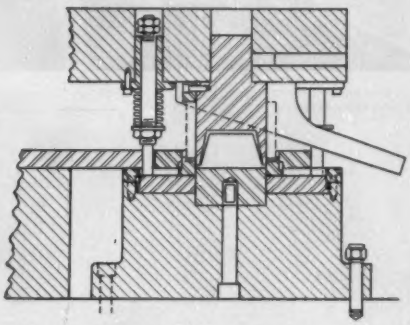
Means of feeding dials aside from manual feeding are: magazine, hopper, roll feed, slide feed, friction disk, and hitch feed. Means of discharge of parts from the dial include pushing parts through, air ejecting, lower knockout and air ejecting, carrying parts up on the punch and ejecting by air, sweeping parts from nest, or picking off.

The type of dial is of course selected by experience with work characteristics, size, operations to be performed, etc. But the setup is an entity consisting of the press, dial, actuating means, accessory drives, hoppers, magazines, and special tooling. You can best see what can be done by considering a few examples of tooling developed for various jobs.



Redrawing on dial faster, saves operators

Ten operators would be needed for single-operation setups for redrawing, trimming and partial curling of a cup. Dial-feed press with one operator produces 55 pc per min.



A tapered cup with a partially curled edge ready for crimping into a muffin tin is a prime example of savings with a dial feed. This part is put through four secondary operations at the rate of 55 pc per min, two and one-half times as fast as any of the operations could be performed with ordinary single-stage tooling.

The rough-drawn, tapered cup is moved from the draw press by conveyor to the dial-feed press. Here, the operator puts the piece flange down into the dial, which conveys the part to a redraw station.

Three additional operations are now performed. At the redraw station, the dial bushing and part are pushed down and out of the dial by the redraw punch, to avoid any strain on the dial itself. The dial bushing is supported by pressure pins and a rubber cushion pad. Pressure pins lift the bushing back into the dial.

A trimming operation is performed with a punch of fixed length. The other three punches are adjustable. The tapered hole in the punch centers the cup over the trimming die, and pushes the part and bushing down over the centering plug. The bushing does the trimming in this case.

The third and fourth operations consist of forming a U and then toeing-in the U. In the last station the punch must center the piece, because the forming operation produces a diameter smaller than the bushing.

55 copper return bends

Copper return bends for room coolers must be accurately formed and they should have a brazing ring correctly and positively inserted in each end. A number of second-operations and handlings are avoided by making this part in a dial-equipped 50-ton press. Production rate is 55 pc per min.

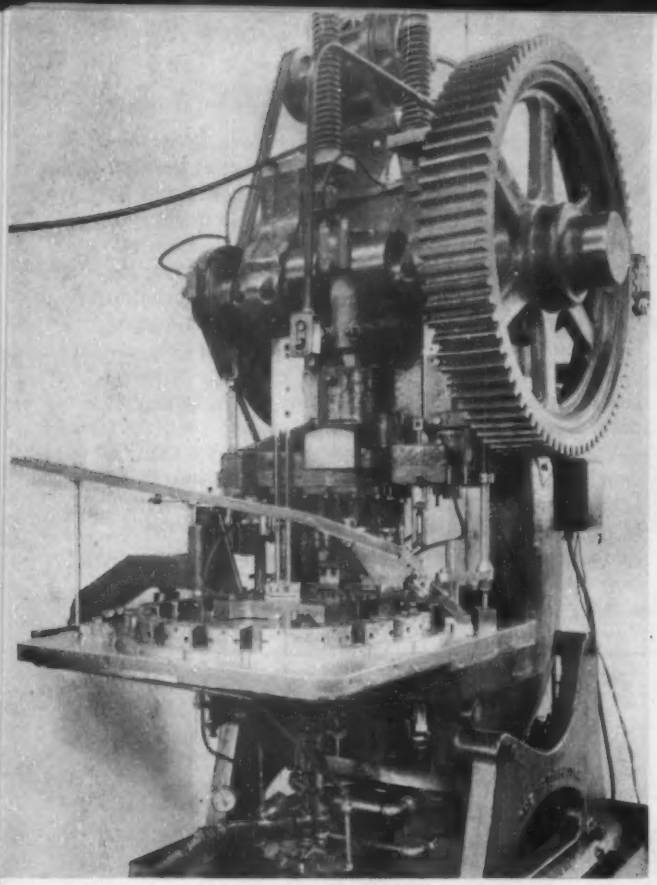
The dial is fitted with 20 dies. Tooling for forming the U-bend, bulging to proper contour, and inserting the brazing rings is mounted at the rear of the dial and under the press ram. A chute carries the 4-in.-long pieces of cut tubing to the forming station, and two magazine feeds supply brazing rings to a transfer slide.

Operation of the equipment is:

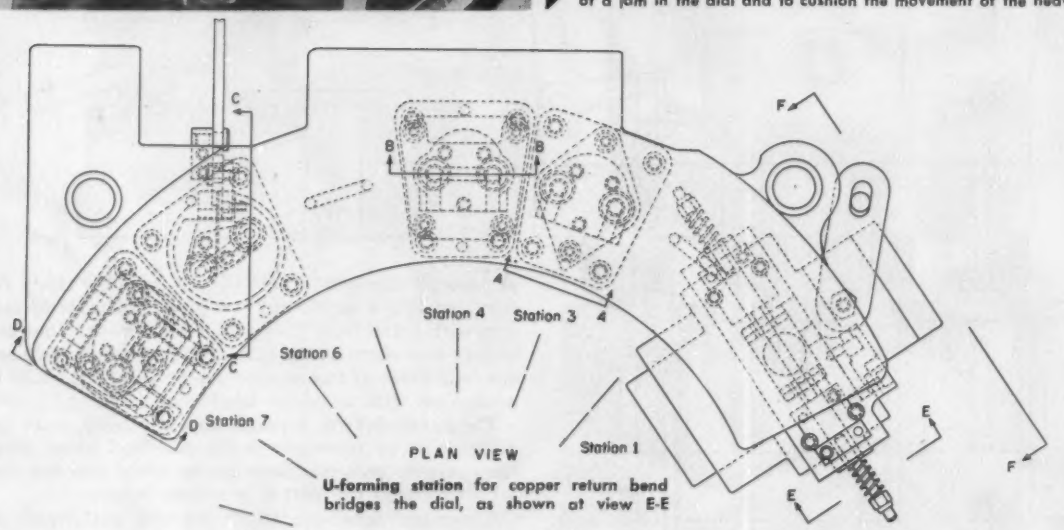
Station 1—As the press ram descends, the punch at the forming station U's the piece and carries it down into a split contour die. Before the dial moves, the split die is closed around the bent tube by a bottom motion.

Station 2—Idle.

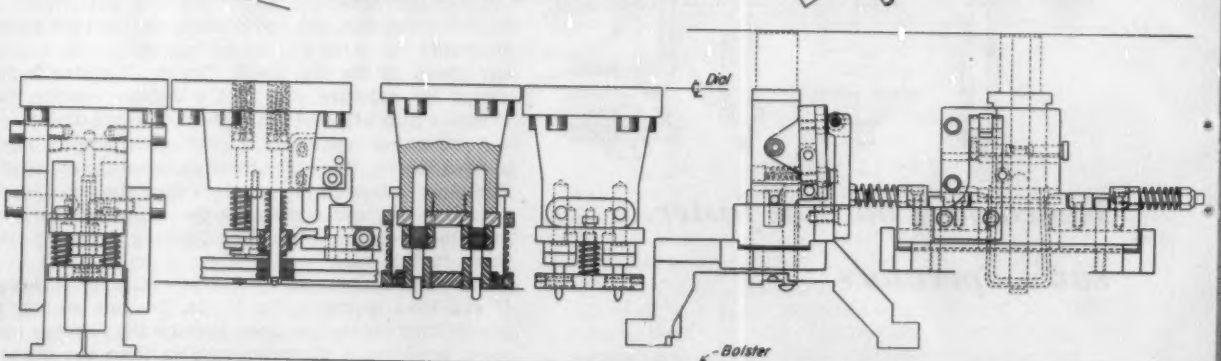
Station 3 and **Station 4**—Water is introduced to the return bend. Punches, carried on the slide, enter the open ends to "blow up" the tube to the original cross-section and to shape the ends to receive the brazing



Dial for making copper return bends is driven from the press shaft. An air cylinder is interposed in the drive to collapse in event of a jam in the dial and to cushion the movement of the heavy dial



U-forming station for copper return bend bridges the dial, as shown at view E-E



per minute

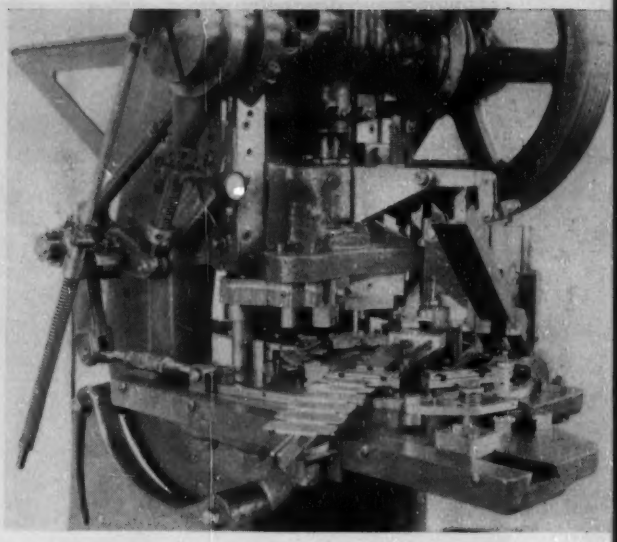
rings. During the blowup operation, the die is clamped by an air-operated toggle.

Station 5—Idle.

Station 6—Brazing rings are inserted in the return bend, one to each open end. A Micro-Switch checks whether both pieces have been inserted, and to proper depth. If not, the press is stopped at top stroke. Brazing rings are held in two stack feeds fastened to the central, stationary part of the table, inside the rotating ring-type dial. A slide transfers the rings to the position where the punches can press them into the tube ends.

Station 7—The open ends of the tube are curled to retain the brazing rings, any water is removed, and the bend is ejected from the dial.

Tooling Features—all punches are carried on the punch holder, and these with the two guide posts and the dial work together as an "overgrown" dieset to maintain alignment. As a matter of fact, all tooling details are made accurately and can therefore be put in the press just like a die. The bulging operations were placed intermediately in the sequence to center the load in the press.



Two blanks for an ice-tray separator are fed from separate magazines. A riveting operation and a 2-stage forming operation are performed by the tooling at rear of the dial. Production rate, 65 pc per min. A setup of this kind does the work of several operators and several machines, when arranged for single-operation tooling

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Five hoppers supply dial feed

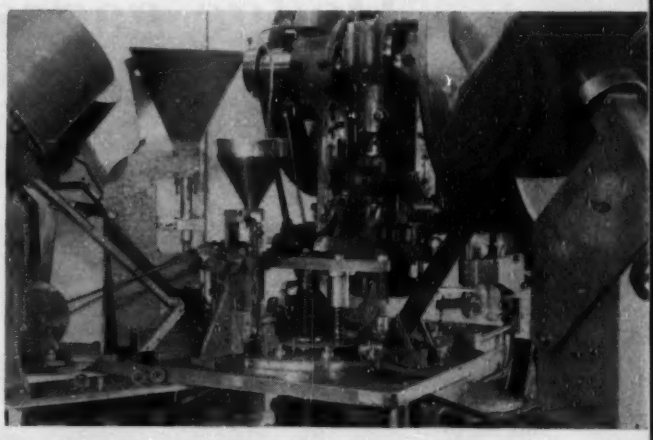
Sometimes, it is difficult to see the dial because of the feeding and transfer equipment applied to the setup. This is the case for a dial feed designed to assemble bearings for roller conveyors. Hoppers are used to feed the outside case, the center core, a lower race, 13 balls and the upper race. The ball hopper will not feed unless the outer case is present in the assembly at that point. After the components are all in position, a checking station proves the assembly or stops the press if incorrect. If the assembly is OK it passes to two closing stations. The operator's job is to keep the hoppers full. Press runs at 50 strokes per min.

On work of this kind, the parts supplied to the machine must be uniform in dimensions and clean. Otherwise trouble will result. The dial-feed press is therefore an inspector of prior operations, and stoppages will indicate where prior operations should be improved. Attention thus directed generally results in improvements and reductions in cost of making the component parts of the assembly.

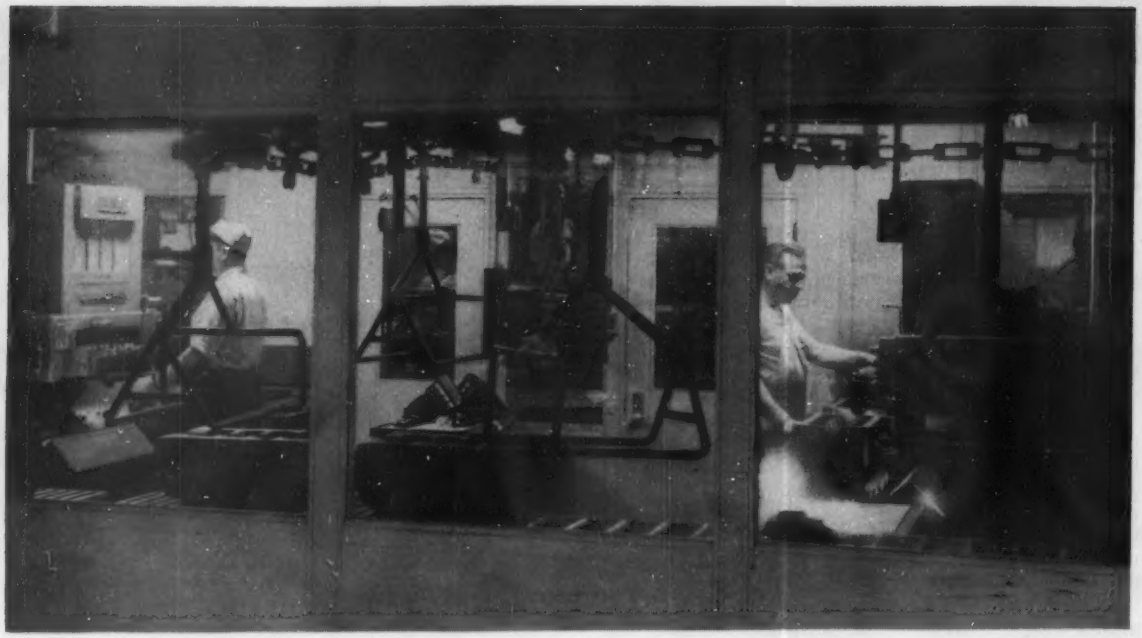
For products to be dial assembled, the component parts must be better finished and held to closer tolerances than is customary. However, the effect is a better product and a trouble-free assembly. One can say that if the component parts are made right by good tooling, a lower unit cost will result in the end. And because products fed by hoppers must fall into this category, one can say that the equipment is capable of producing an acceptable product with an extremely low percentage of rejects.

In this setup, the dial moves counterclockwise. Near the horizontal centerline of the dial, at left, an outer case is fed to one of the 16 dies by a hopper. At the next station, a lower race is put into position. Next, the bearing core is placed, then the 13 balls are counted and inserted. Finally, the upper race is correctly fed and positioned to complete assembly of the parts.

As the dial rotates to the upper right-hand quadrant, two Micro-Switch inspections are made. In one case a pin determines whether there are enough balls in the assembly. In the second case, the height and levelness of the upper race are determined. If these inspections are satisfactory, the dial progresses to two stations under the ram. Here one punch turns in the open end of the outer case by 45° and the second punch flattens it to complete the assembly.



Before closure of the bearing assembly, two inspections are made by electric switches to make certain that enough balls have been put in and that the upper race is in proper position



AIR-CONDITIONED, TEMPERATURE-CONTROLLED GAGE ROOM in middle of machining area permits close check on engine-bore dimensions. Overhead and roller conveyors move from right to left

Dodge gages V-8 bores in the

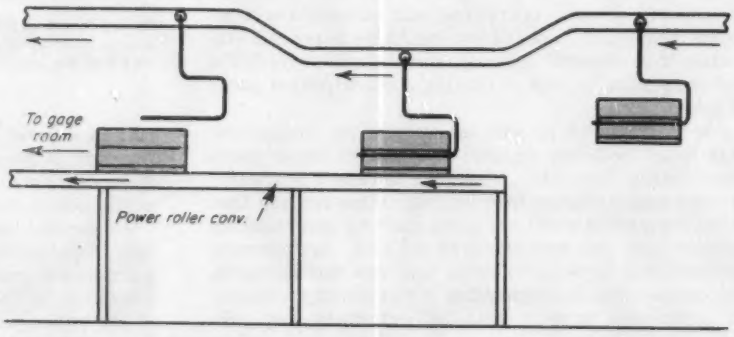
BURNS S MAC PHAIL, gage engineer, Dodge Div. CHRYSLER CORP. DETROIT

High-production gaging to close tolerances calls for special treatment anywhere, but when the gage room is in the middle of a machining area, special treatment must be extra deluxe. The answer to the question of how to provide clean conditions is an air-conditioned room fitted with pressure air locks that keep grimy shop air outside, even though parts are fed into the room.

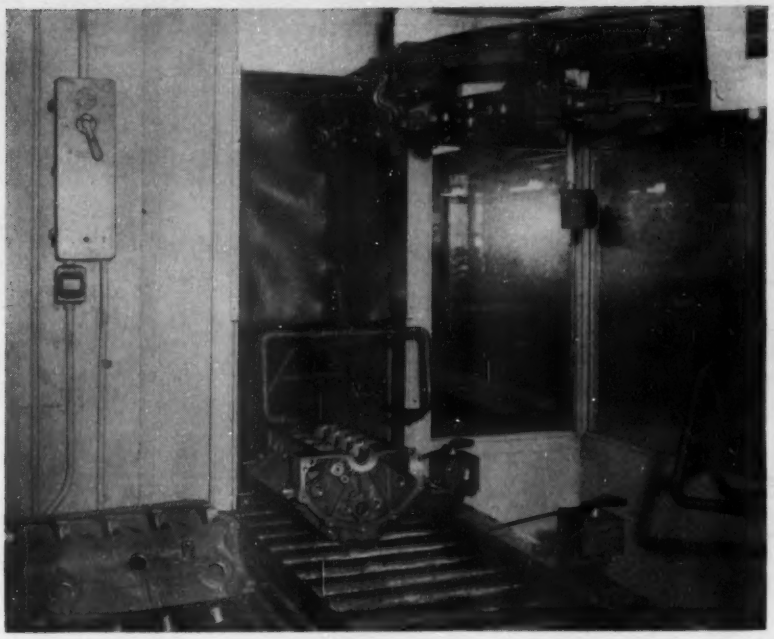
Engine blocks come in through a washing and drying tunnel, carried by cradle fixtures swung from an overhead chain conveyor. Just inside the gage room they are transferred down to powered roller conveyors that lead them to the two air-gaging setups that check eight bores in each block. The switch from overhead to roller conveyor (see sketch) depends on timing and block location.

Visual inspection is important, so fluorescent lighting is located above and under the gage setups. For the close work, each setup has four gaging heads working up from below, at an angle. Measurements for diameter, taper, and out-of-round are made, indicated on four air-gage indicators, and converted into classifications. The operator sets a die above each bore to the index of classification, and the classification number is stamped on the head of the block next to each bore.

Fixtures at each gage rotate the blocks so the second set of bores can be inspected, then slip them off to the roller conveyor that carries them out of the gage room to later operations.

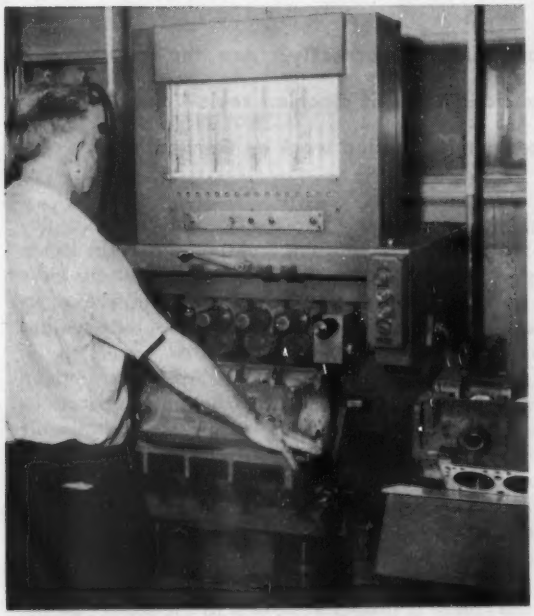


TRANSFER WORKS LIKE THIS: Overhead chain dips down until weight of block is taken by rollers, then bent-pipe carrier rides free. Block moves forward past open end of carrier because rollers move it faster than chain. Chain then lifts carrier free to clear block

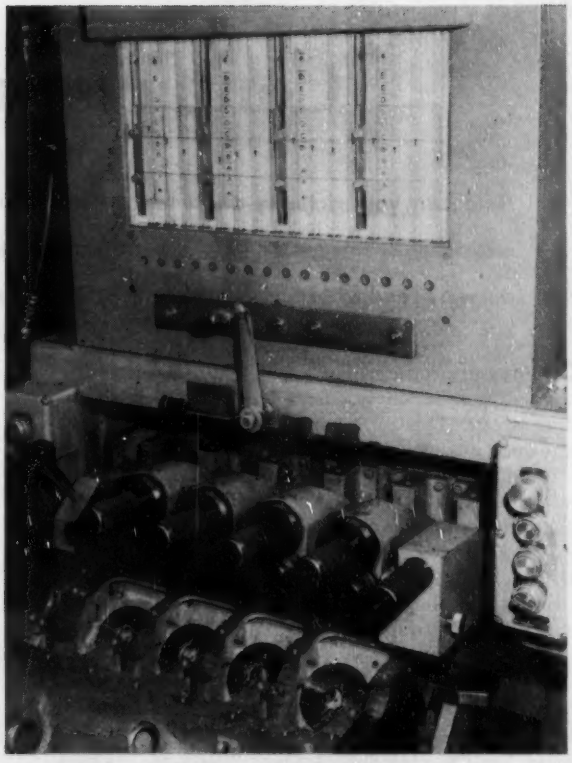


AFTER WASH AND DRY, BLOCK MOVES into gaging room on powered roller conveyor, to which it has been transferred from overhead chain

machine shop



AIR GAGE CHECKS TAPER AND OUT-OF-ROUND (limit is 0.001 in.) in each bore, and measures diameters within 0.0025 in. for acceptance. Each bore is classified within a 0.00025-in. interval and stamped



BORE CLASSIFICATION IS STAMPED ON BLOCK close to bore by dies adjusted by operator according to air-gage reading. Pistons to match are later assembled by matching classification identification. Block is rotated 180° so opposite four bores can be measured

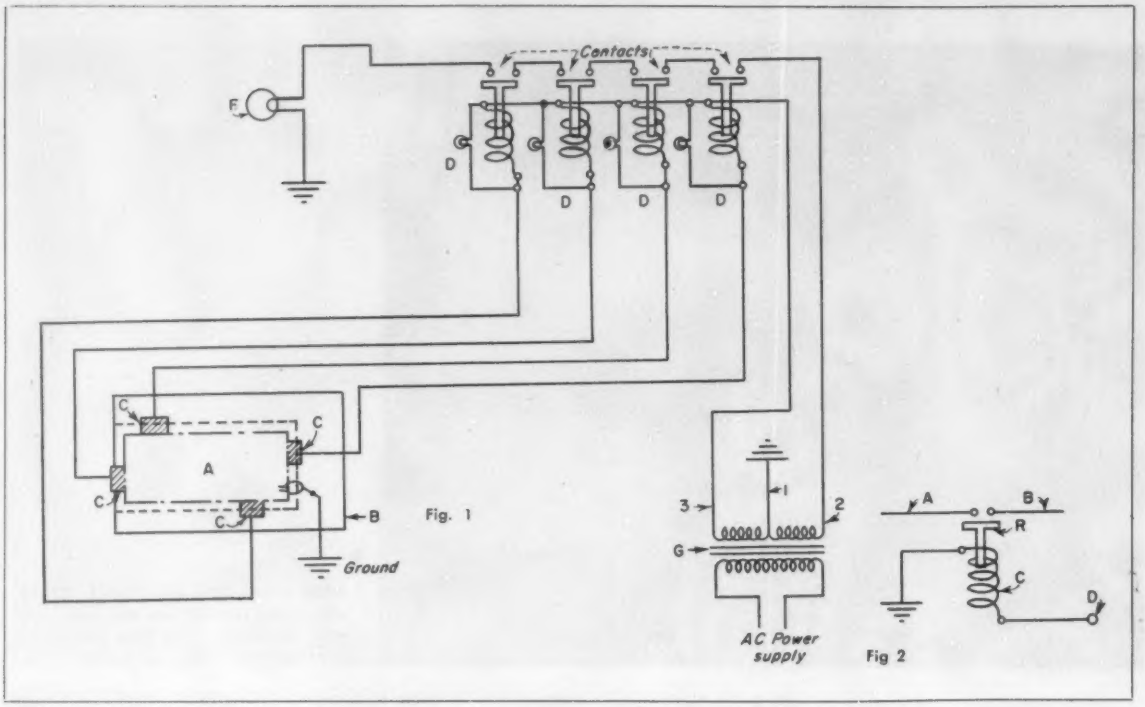


FIG 1 . . . Schematic arrangement of the circuit that indicates whether the workpiece *A* is properly located in fixture *B* by being in contact with four contact buttons *C*. Power cannot flow to lamp *F* until all relay contacts have been closed. Fig 2 . . . The work itself acts as a switch, because it must touch contact *D* to complete the circuit

Contacts in fixtures assure

How can you virtually force an operator to load fixtures correctly? Are the means relatively simple? Can the idea be applied to various kinds of machine tools? For the answers read what Springfield Armory has done to minimize spoiled work on Garand parts

One of the problems confronting the manufacturer of small component parts is inconsistent repetition of accuracy. This problem is the result primarily of improper placement of workpieces in fixtures.

Training of employees in proper work methods is not enough to overcome the problem, especially in plants where incentives are used. Lack of proper attention by the operator in placing a workpiece on the machine, failure to remove chips from locating surfaces, or plain carelessness usually result in an error in the cut made by the machine. The result is a spoiled workpiece.

There is also the possibility that damage to the machine tool will result from inaccuracy of bedding or seating of the work in the fixture. Such waste is costly in time, labor and expenditure of material, and is especially serious when components are in the final stages of machining.

To eliminate this problem, Springfield Armory, manufacturer of the famous Garand rifle, has developed energizing buttons incorporated in the locating surfaces of fixtures and jigs. These buttons have helped immeasurably in achieving repetitive accuracy. In many instances, use of the buttons has eliminated rejections.

Application of the Armory device relates to an improved fixture to expedite machining operations on metallic workpieces. It is particularly applicable to quantity-production operations in which the position of the cutting tool is initially adjusted by a skilled workman or setup man. The machine tool is then used on a large number of identical workpieces, without change in adjustment, by a relatively unskilled operator. He immediately perceives whether a workpiece is properly located in the fixture or jig.

Various types of indicators can be used to inform the operator whether or not the work is properly bedded. Indicators may take the form of a light,

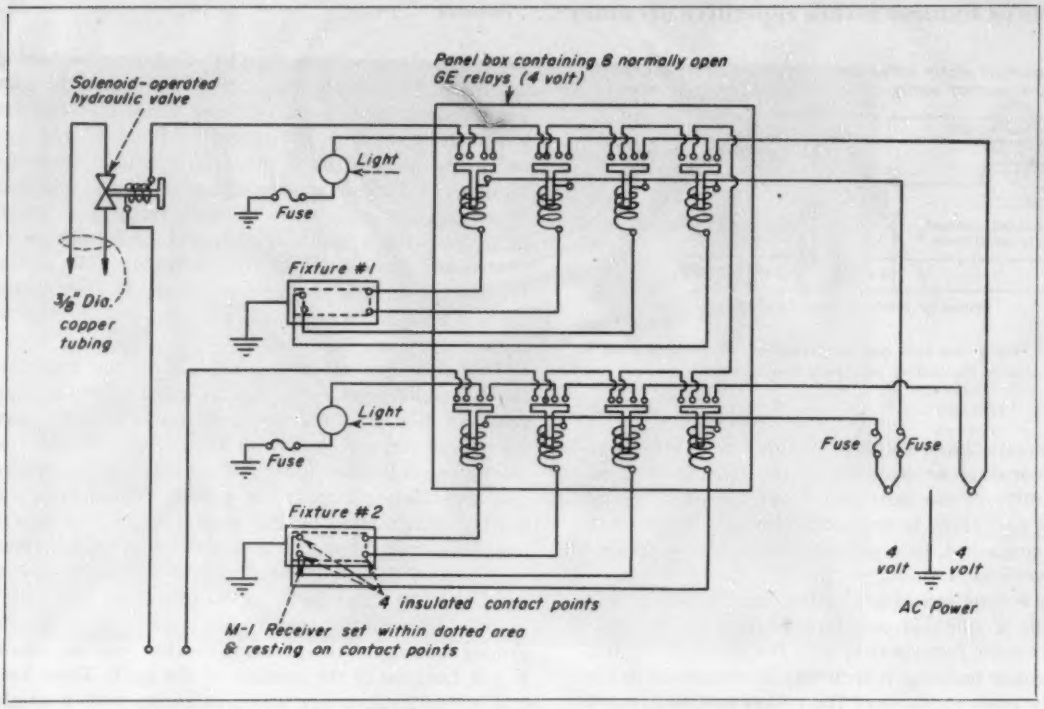


Fig 3 . . . For a 2-spindle precision boring machine, the fixture-loading control involves an indicating lamp for each fixture, and a solenoid-operated valve that will not permit the machine to function unless both fixtures are loaded properly

repetitive accuracy

FRANK E PIEKOS, production foreman
DEPT 58, SPRINGFIELD ARMORY

a bell, or feel of a certain movement of some part of the mechanism.

Protective devices can be added, so the operator cannot start the machine cycle until the work is properly located in the fixture. An electrical circuit is one means. The arrangement can be such that the operation of the machine (feeding the tool) is automatically prevented if the work is not properly located in the fixture or jig. This is accomplished primarily by including the fixture, the workpiece, and the indicating means in a circuit.

Applications of the energizing buttons to fixtures can best be visualized from a schematic diagram and typical fixtures used to make gun parts.

SCHEMATIC DIAGRAM OF FIXTURE

In Fig. 1 location of workpiece *A* in fixture *B* is determined by four metallic contacts, or energized buttons, *C*. Any number of buttons can be used, and they can be placed at any predetermined arrange-

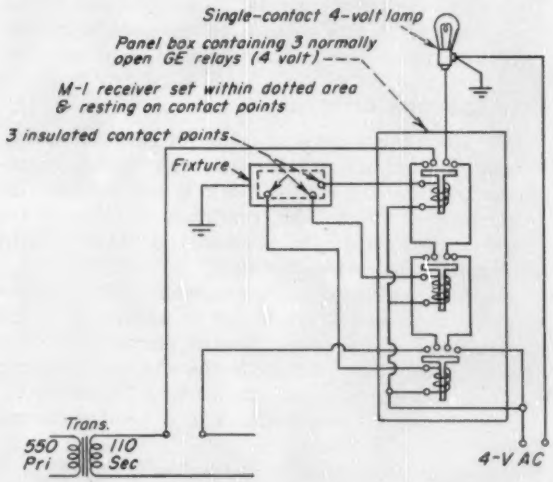

Single-contact 4-volt lamp
Panel box containing 3 normally open GE relays (4 volt)
M-1 receiver set within dotted area & resting on contact points
3 insulated contact points
Fixture
Trans.
550 Pri
110 Sec
4-V AC

FIG 4 . . . For a plain milling machine, the circuit not only lights a lamp when the work is properly located in the fixture, but also makes the starting circuit operative when the master start switch is pushed by the operator

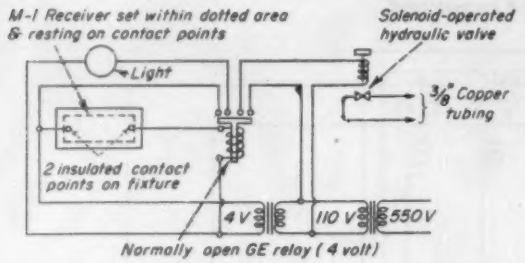


FIG 5 . . . Two of the four contacts closed by the relay operate a solenoid valve in the milling machine's feed circuit

ment to suit the workpiece contour or features, so correct location or bedding of the part is assured. These contacts are insulated from the fixture, and they are connected to solenoid relays *D*. The fixture itself is grounded, or a ground clamp can be applied to the work.

Lamp *F* (the indicating source can be also a bell, buzzer or a solenoid-operated control on the machine, or some feature that tells the operator by feel when proper bedding is secured) is connected to the normally open contacts of the relays and to ground. These contacts, in turn, are connected to tap 2 of transformer *G*.

The secondary winding of the transformer has three taps. Tap 1 is grounded. Tap 2 is connected to the relay contacts as mentioned. Tap 3 is connected to all of the parallel-connected, relay-solenoid coils, and then to buttons *C*.

The indicating circuit is not completed until all of the energizing buttons are in contact with the work. This is true because all of the relay contacts must be closed by the energized solenoids. The relays are actuated by power flowing from tap 3 of the transformer to the relay coils, to the buttons and thence to ground. If one or more buttons is not in contact with the work, the indicator-circuit remains open.

BAD LOCATION DETECTED

By providing a separate relay for each energizing button, or contact, the operator can readily determine which point on the work is not bedded. He can observe either the condition of the relays (whether they are open or closed), or watch a light connected into each coil circuit.

Fig 2 shows a modified arrangement. Pull-out relay *R* has its coil *C* connected to button *D*. If the workpiece is not properly bedded, contacts A and B in the power line leading to the machine tool are opened and operation of the machine is prevented. In this case, the work acts like a remote-control switch.

If the machine tool is hydraulically operated, a hydraulic valve could take the place of the energizing button, to prevent feeding the tool into an improperly located workpiece.

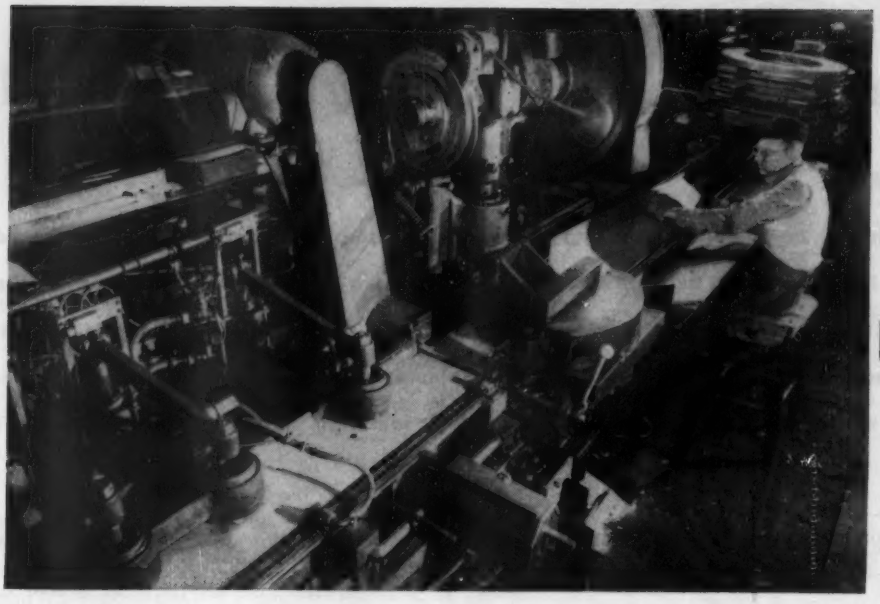
Errors in precision boring the M-1 receiver have been overcome by equipping the fixtures with four energizing buttons. Both roughing and finishing fixtures are used on the Ex-Cell-O 2-spindle boring machine. The arrangement, Fig. 3, consists of four insulated contacts in each fixture. These contacts are wired in series with an indicating lamp, so any error made in locating a piece is identified immediately: As a further guarantee against error, one pair of contacts at each relay on both fixtures is wired in series with a solenoid-operated hydraulic valve controlling movement of the boring-spindle slides. By this means, the machine is prevented from functioning until all workpieces are properly located in their respective fixtures.

To perform a milling operation on the receiver, the part is placed in a fixture with three locating contacts, Fig. 4. Three normally open 4-volt relays are wired in series with the buttons. When the workpiece is bedded properly, all low-voltage relays and the starting circuit are closed. By pushing the master start switch on the machine, starting relays are closed and the machine functions. A transformer was necessary to step down the 500-v primary power source to 110 v for the relay control panel.

Only two contact points are sufficient to insure proper loading of the piece in another milling setup, Fig. 5, because of the contour of the part. These two energizing buttons are wired in series with a single relay. The relay closes four contacts. Two contacts are wired in series to the indicating lamp and the other two contacts are in series with a solenoid-operated hydraulic valve that controls the machine. Two transformers are necessary to supply the 4-v and 110-v control circuits involved.

These applications of energizing buttons in fixtures are not all of the satisfactory installations functioning at the Armory. We have applied the principle to fixtures for vertical broaching machines, 360° automatic profilers, and multiple-spindle drilling machines. Reductions in spoiled work and increased production have proved the merit of the program in all instances.

"As in every profession we have some that didn't quite realize their life's ambition."

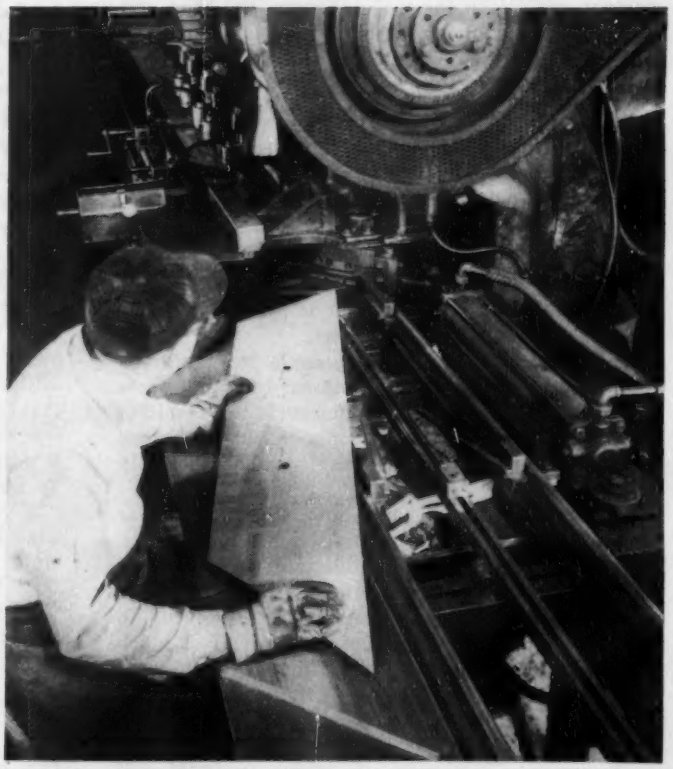


ADJUSTABLE - POSITION DIE SETS (left) punch one to four bolt holes in lamination stock as mitering die shears off completed piece. Sets are adjusted to position with pin gages; can take a number of sizes of round punches. Feed - table guides are also adjustable for other stock widths

You can miter strip stock, too

A rotating die in a conventional C-frame press trims silicon-steel strip on the bias for large transformer laminations in this setup. Stock is fed by an uncoiler and a roller strip feeder down the punching table to the press, and an operator picks off finished laminations and stacks them

L W TIEFEL, transformer div,
WESTINGHOUSE ELECTRIC CORP,
SHARON, PENNA



AIR CYLINDER ROTATES DIE 90° as ram actuates switch at end of each stroke, producing 45° miter on each end of lamination. Operator controls setup with two pedal switches that actuate roll feed and press. With press going at 90 spm, rate is 960 pc per hr

The tool design checker... balance wheel

If a man is assigned to check tool designs, it is obvious that he must be an experienced man in the designing field, or else he won't: (1) know if a design is practical, (2) be able to guide younger men on the boards, and (3) see the wisdom of giving customers what they want. His job calls for a diplomatic bent. Can your tool-design checkers measure up to the specifications set forth by an old-timer in the field?

Tool engineering has come into its own in the last quarter of a century. Today, it is recognized as a skilled profession and rightfully so, because daily the requirements of the field become more numerous. Because of the ever-increasing demands of mass production, machines and tools are becoming more complicated. The origination of these ingenious devices depends on the varied skills of many people. Among them the tool-design checker plays an important role—with the tool designers, the shop and the customers. Why is he necessary; what does he do? Here are some thoughts on the subject:

I. What is a tool-design checker?

A tool-design checker is an employee of a tool-designing department, and he checks drawings made by tool designers.

II. What are the duties of a tool-design checker with reference to tool drawings?

He should check all drawings to see that the following "musts" are incorporated.

1. The drawings must represent a workable design; that is, they should conform to sound tool-engineering practice. Every design is the result of someone's opinion, and this opinion should be respected so long as the final result is fundamentally workable.

2. Drawings must be laid out to scale whenever possible. An accurate drawing is not only much easier to break down or detail into its component parts, but it also serves as an approximate check if any mathematical calculations are involved. In addition, if a drawing is accurately done, it is much easier to detect interferences which inevitably occur.

Finally, the customer for whom your designing room may be working is always favorably impressed with accurate workmanship, which in itself will greatly enhance the future of your designing organization.

3. The component parts of a design must be properly shown and dimensioned in order to facilitate ease of assembly when the tool is built in the toolroom. It is important that all parts of a tool fit together in a predetermined pattern. Correct dimensioning will accomplish this. A single dimensioning error that could have been corrected in a few minutes by a competent checker might easily add many hours to the toolmaking time. A company noted for its excessive hours on tools soon closes its doors.

4. Drawings must be reasonably neat and complete, with reference to lettering, line work and arrowheads. Good appearance is an important selling point.

III. What are the qualifications of a tool-design checker?

1. This question will no doubt surprise many readers. In the author's opinion, one of the most important and often overlooked qualities a checker should have is a genuine interest in the welfare of the people whose work he checks. A checker is an important link between the designer and management. For him to assume an aloof "know it all" attitude only increases the slight amount of tension that naturally and normally exists between the checker and designer. This "genuine interest" item is part of what I like to call "human engineering." To ignore it indicates limited vision.

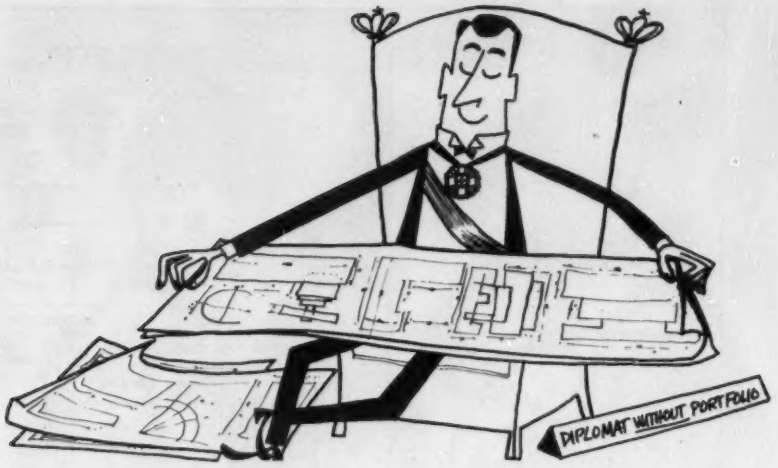
2. A checker should have a good working knowledge of mathematics. This knowledge should include:

1. Shop mathematics
2. Some algebra.
3. Practical geometry and trigonometry

A checker will use mathematics for figuring gear teeth, shrinkage allowances, bend allowances for formed stock, locating dimensions for studs and holes, stack-up dimensions for multi-layer tools, cam outlines, travel of moving parts, and oil and air pressures. This list, of course, just scratches the surface.

3. A checker should have a sound knowledge of

or brake?



C BOSSMAN

modern toolmaking methods. Some designs cannot be fabricated. When this condition arises, an alert, well-informed checker will immediately detect it and attempt to have the design improved. A checker is a much greater asset if he is aware of the many building problems which daily arise in the toolroom.

4. A checker should have a sound working knowledge of steels and their proper applications and heat treatment. The steel industry has made tremendous progress since 1941, and new tool steels are constantly being introduced. Accordingly, the checker should keep abreast of developments and familiarize himself with as much of the latest steel data as possible. Trade announcements and steel catalogs are good sources.

IV. What is proper checker-management relationship?

As explained earlier, the checker is the mediator between management and designer, but he should always remember that a final decision comes from management, and that he should act accordingly. Here is an example. After having examined a design, the checker thinks it can be appreciably improved. To remain silent and not mention his ideas to management would brand him as a spineless individual. For his own self respect, he should speak his piece, doing so diplomatically. In presenting his ideas, he should be factual and stick to the point. If, after having done this, management decides to adhere to the original design, the checker should immediately drop the subject and check the drawing through as is.

Some checkers put the initials NG (no good) in some obscure corner of a drawing of which they do not approve. Others sign the drawing, using a fictitious name. This approach is not recommended if the checker wishes to remain on speaking terms with his immediate superior. Mutual respect between the checker and management is one of the most important requisites of a going concern.

V. What is proper checker-design relationship?

To establish an understanding, cooperative relationship between the checker and the men whose work he checks is necessary. More direct contact exists between them than between the checker and management.

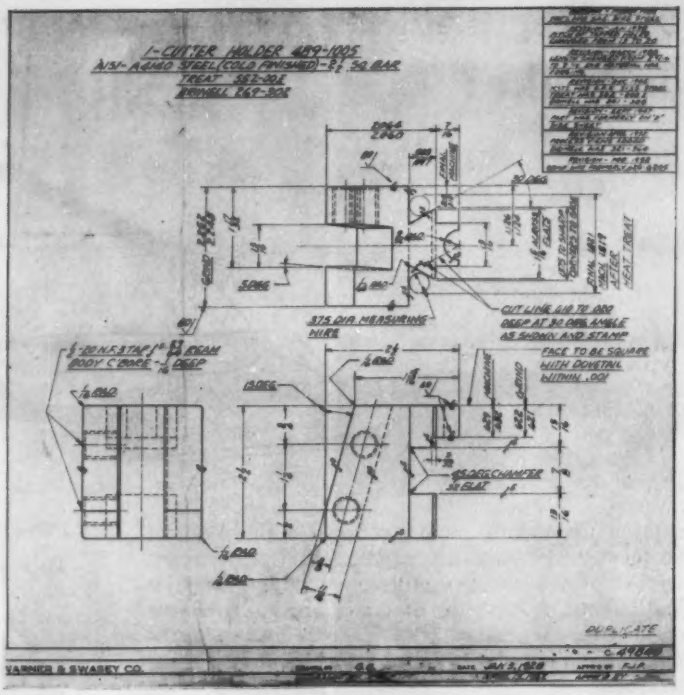
Accordingly, the checker must develop a genuine interest in the designers and make a special effort to work with them effectively. If a person has an open mind, he will be able to learn something from anybody. With this attitude, a checker will absorb just as much knowledge from his fellow workmen as they do from him. There will then exist a mutual exchange of ideas and theories which cause stimulation in any designing room.

The checker should devote as much time as possible to the younger men, who naturally have had limited experience in the designing field. To dismiss them as being "bothersome kids" will discourage many a young man from continuing his apprenticeship. After all, these individuals are our future leaders in industry, and to help and encourage them is a checker's patriotic duty as well as his duty to management.

VI. What is proper checker-customer relationship?

In small jobbing shops, a checker may have to work on orders from perhaps a dozen different concerns. Every concern has its own set of standards to which they expect adherence. The checker should respect this, even though his ideas may not exactly coincide with certain phases of their requirements. Some concerns want their forming pads left soft while others want them hardened. Some concerns insist on calling for only SAE rated steels while others let you use your own judgment.

In a situation of this kind, a checker should always remember that he is working for the customer, not the other way around. To be a happier and consequently a more valuable employee, a flexible mind is certainly a great asset. However, this attitude must be cultivated continuously.


1-CUTTER HOLDER 4B9-1005
.375 DIA MEASURING WIRE
CUT LINE 1/16 TO .020 DEEP AT 30 DEG ANGLE AS SHOWN AND STAMP
FACE TO BE SQUARE WITH DOVETAIL WITHIN .001
WARNER & SWASEY CO.

OLD DESIGN

TOOL-SHANK DOVETAIL was causing trouble at assembly, resulting in excess rejections. Investigation by foremen, tool technicians, and engineering department representatives showed that drawing tolerances and checking gages were inadequate. After production-engineering conference, part was redesigned, with new process methods, new standards for dovetail dimension, and added tolerances to limit parallelism and squareness. Redesigned parts were then satisfactory

"Excess rejects" spot

"Three heads are better than one" is a principle which solves quality-control problems quickly and effectively. When trouble occurs, the machine operator, foreman, and inspector act together to ferret out the cause, and come up with the cure

. . . the inspector writes up an excess Reject Card. . . .

Success of any quality-control program depends on several groups of people working together as a well-integrated unit. In our company, making precision machinery, there are three groups responsible —machine operators, their foremen, and inspectors.

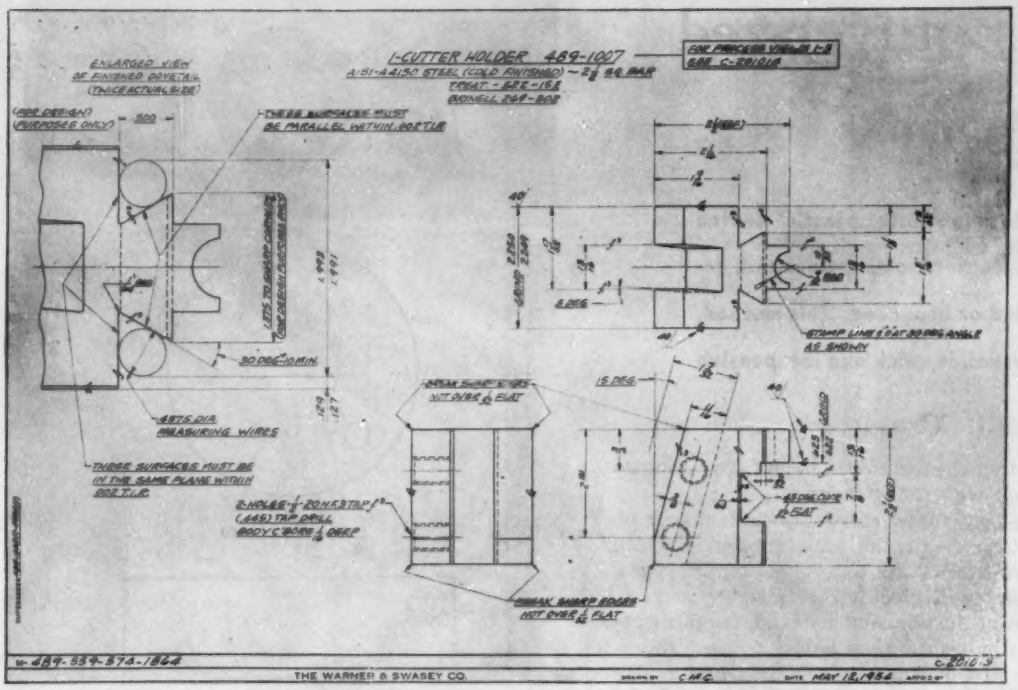
To help these groups work together more effectively, we have developed a unique quality-control system which we call the "Excess Reject System." This system has proved highly successful in overcoming our quality-control problems, reducing scrap, improving quality, and raising morale by putting into action, rather than words, our belief that the worker is the base of the quality-control pyramid.

The Excess Reject System works like this:

When there is excessive trouble holding engineering specifications on a job, the inspector in that department writes up an Excess Reject Card.

On this card are written the part name and number, operation number, M O number, department, date, pieces in the lot, pieces rejected, and reason for rejection. The card is signed by both the inspection supervisor and the foreman. It also carries the words, "Notify foreman before starting operation."

The original copy is sent to the inspection department, and the duplicate, which is made of cardboard, is attached to the setup card on the machine where the job is run.


I-CUTTER HOLDER 489-1007
A-31-A413C STEEL (COLD FINISHED) ~ 2 1/4 SQ BAR
TOOL - SEE-158
ROCKWELL 24F-30B
ENLARGED VIEW OF FINISHED DOVETAIL (TWICE ACTUAL SIZE)
(FOR DESIGN PURPOSES ONLY)
THESE SURFACES MUST BE PARALLEL WITHIN .0001 T.I.R.
.1875 DIA MEASURING WIRES
THESE SURFACES MUST BE IN THE SAME PLANE WITHIN .002 T.I.R.
90 DEG ± 10 MIN.
BREAK SHARP EDGES NOT OVER 1/64 FLAT
2-HOLES 1/4-20 NF-3 TAP (.446) TAP DRILL BODY C'BORE 1/8 DEEP
15 DEG.
45 DEG. CHFR 1/64 FLAT
STAMP LINE 1/64 FLAT 90 DEG. ANGLE AS SHOWN
BREAK SHARP EDGES NOT OVER 1/64 FLAT
489-559-574-1854
THE WARNER & SWASEY CO.
C.W.G.
MAY 12, 1954
C-2016-3

NEW DESIGN

process troubles

STERLING WINCHELL, chief quality engineer,
THE WARNER & SWASEY CO, CLEVELAND 3

The next time the job comes up, the operator calls his foreman over to the machine before setting up. The department inspector is also present.

The group may find that the job requires a change in the manufacturing method, changed engineering specifications, different tooling, or closer attention by the operator.

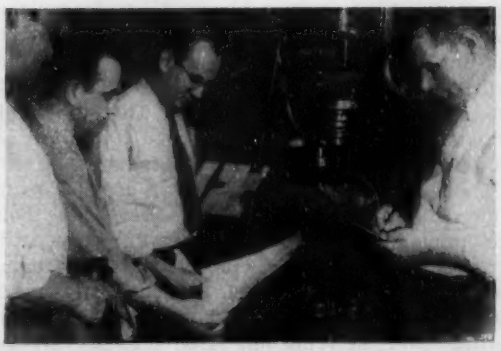
When the problem has been solved, the corrective action taken is written on the back of the Excess Reject Card, which is then returned to the inspection office, where it is kept as a permanent record of the steps taken.

This system was put into effect one year ago, as a method of permanently correcting a large percentage of ordinary operating difficulties. Since then, it has been refined to the point where it easily corrects some extremely difficult operational problems.

Let's consider the unusual case where this system does not work the first time:

The operator, foreman, and inspector have all closely examined the setup and operation, and have been unable to determine just what causes the problem.

Again an Excess Reject Card is issued. The next time the job is run, the foreman, operator, inspector, and representatives of the other departments concerned with the job are called in. This gives everyone the chance to take a close look at the fabrication method for the particular part, and determine why it doesn't meet standards. Then, putting their heads together, they invariably find the solution.



. . . other departments concerned are called in. . . .

This system has meant a prompt and permanent correction of a large percentage of troublesome operations. It has given us easier methods of making precision parts. Most important of all, it has made our people more quality conscious.

Holes pulverized in plastics

Abrasive glass-laminate plastic switch bodies have center holes pulverized, instead of milled or broached. This method, although unusual, is quick and inexpensive

ALBERT L LEVITT, BRONX, NY

Several hundred electric switch bodies are machined in the unusual way shown here.

The switch-body material is fabric-base melamine glass laminate, a highly abrasive substance which quickly destroys HSS and alloy-steel cutting tools. Carbide cutters will give fair results, if carefully used. Because of the abrasive material, the fabricating method is pulverizing the holes.

Two styles of the hole are needed. One has five lobes, and is ½-in. thick. The other has 6 lobes, and is ⅝ in. thick. The lobes have a maximum radius (at the corners) of 1/64 in.

All cutting has to be done without coolant, because water or oil would soak into the work, impairing its insulating properties. Also, because the dust of powdered melamine is irritating, a vacuum cleaner removes dust being formed.

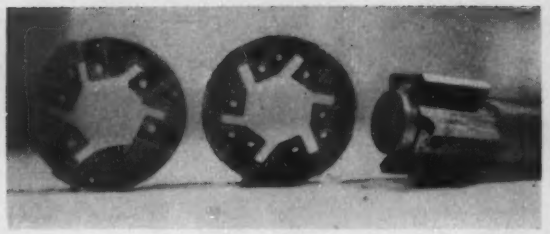
The first step in manufacture is to saw sheets of the material into square blanks ⅛ in. larger than the finished OD. These blanks, ⅛ in. thicker than the finished thickness, are chucked in a lathe and drilled and bored to the largest hole that can be inscribed within the hexagon hole. Then the blanks are stacked on an arbor and turned to the finished OD. Turning surface speed is 60 sfpm.

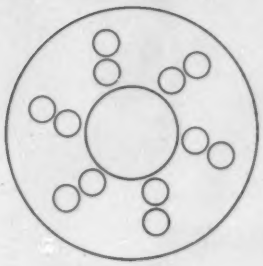
The second step is to drill a series of holes, so the pulverizing tool will have less work. These holes are optional, but desirable, speeding the pulverizing.

The pulverizing tool is made of an oil-hardening, abrasion-resistant tool steel, hardened to about R_c 60-62. Unlike a cutting tool or punch, there are no cutting, rake, or relief angles on the tool face and sides. To add rigidity, the tool body is made twice as long as the work thickness. The tool is made with six lobes. One lobe is ground off to produce the five-lobed pieces.

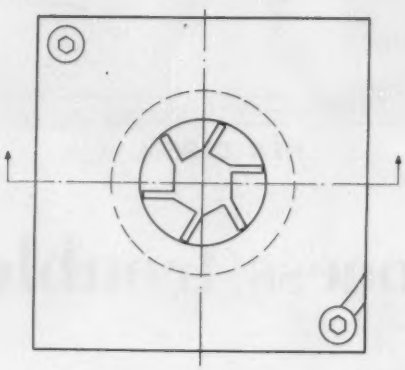
A removable pilot permits refacing the tool if it should become worn. The pilot OD is a slip fit in the nest.

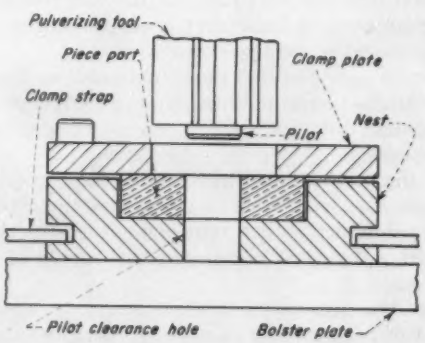
A nest, bored to a close fit to the blanks, prevents the melamine from spreading out when the pulverizing tool strikes. A hole drilled at the bottom of the nest provides clearance for the pilot, and a hinged clamp-plate swings over the nest to hold the parts in place. This plate also acts as a "stripper."





Drilling pattern





The work is set up in a hydraulic, hand, or arbor press, and the pulverizing tool is mounted in the press ram. Lowering the pilot into the hole in the work centralizes the work, which is then clamped in place. The ram is then lowered slowly, and the pulverizing tool powders the melamine. The ram should be raised and the powder removed about three times per piece (for the ⅝-in. pieces).

Because the work is slightly thicker than finished dimension, the tool is not forced all the way through the work. The final step is to take a light facing cut to remove the unfinished part of the hole.

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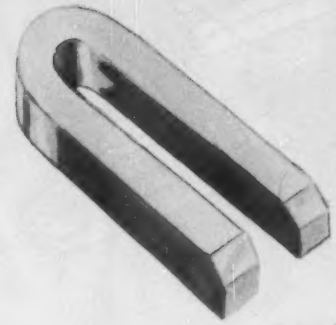
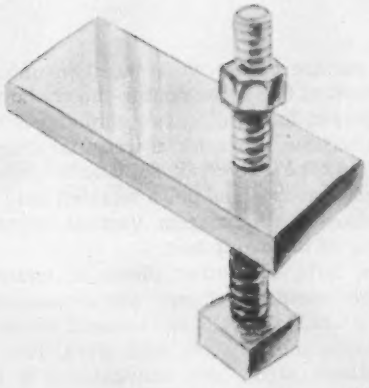
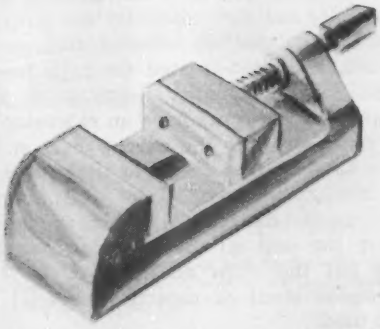
American Machinist

SPECIAL REPORT
NUMBER 376







A HANDBOOK OF

Workholding devices

Part II... STATIONARY DEVICES

An earlier Special Report (AM — Oct 26 '53, p129) dealt with the various devices available for holding rotating work. This one considers the standard vises, clamps, chucks, and other mechanical arrangements for holding work in a stationary position relative to the cutting tool. It does not deal with equipment used on the bench.

This is another American Machinist Service to production executives. It is intended to help train apprentices and new operators of machine tools.

H E LINSLEY, associate editor

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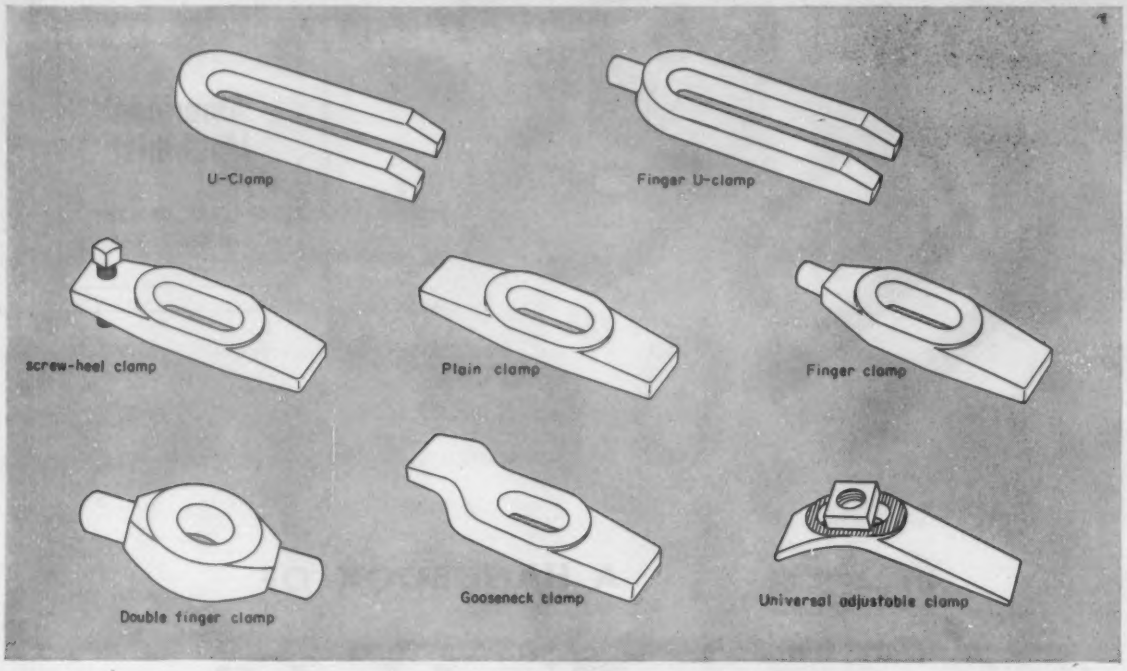


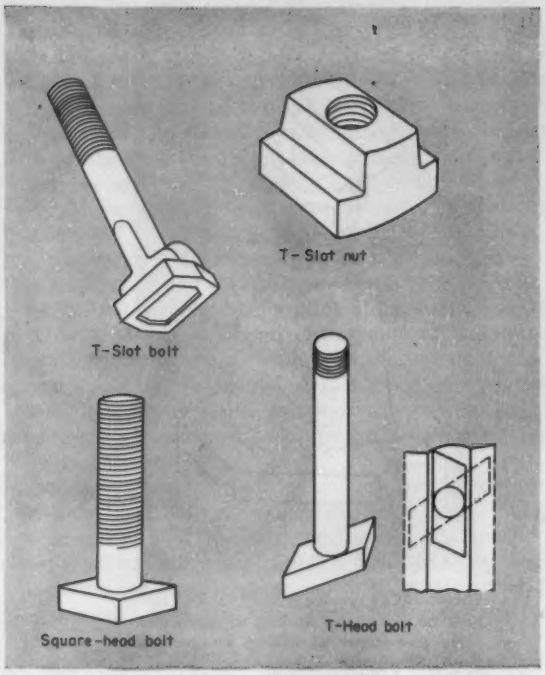
STANDARD, FORGED-STEEL CLAMPS, in these and similar patterns, are the commonest and cheapest devices for holding work. Disadvantage is the slowness of operation because of the need for wrenching down a nut

Clamping devices

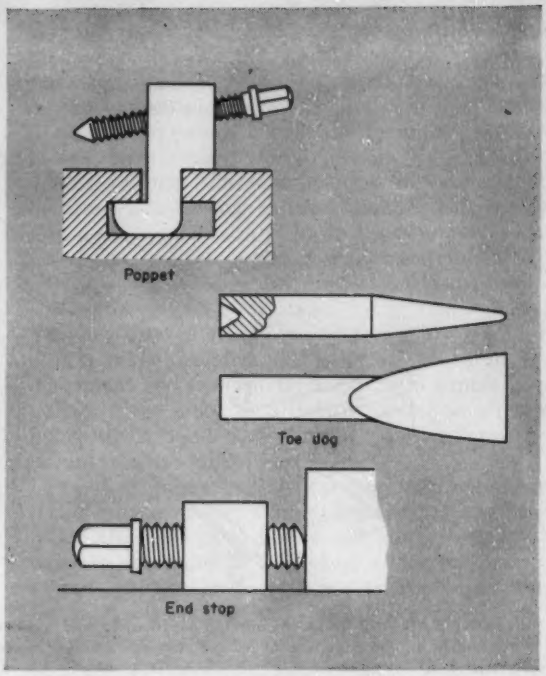
Because human fingers are not strong enough to hold workpieces against the pressure exerted by machine tools, nor could they do so with safety, mechanical means have been developed. These range all the way from simple strap clamps to vises, chucks, and collets. They may be operated by a wrench, a crank, or by air, hydraulic pressure, vacuum, or electricity.

Selection of a particular method of holding a workpiece will be governed by the shape of the work, the production involved, and the availability of the different types of holding devices. The simplest arrangement is merely a piece of square barstock, bent into a U. One end rests on the work, the other end on a block of approximately equal height; a bolt passes between the arms of the U, with its head engaged in a slot in the table and with a nut and washer applying the hold-down pressure. From this have been developed various flat and cranked strap clamps adapted to suit different conditions. One style has a setscrew in the heel to permit rapid adjustment for height; another is cranked to keep the nut below the surface of the work; another has a short pin, or finger, projecting from the toe—the work-engaging end—to fit into convenient openings in the work. This latter type is particularly useful when the top surface of the work must be unobstructed. A variant of this is the double-finger clamp frequently employed for holding two similar workpieces at the same time. For work of irregular shape or varying height, the universal, adjustable clamp is available. This is arched and has a serrated saddle that can be adjusted to maintain vertical, right-angle positioning of the clamp bolt.

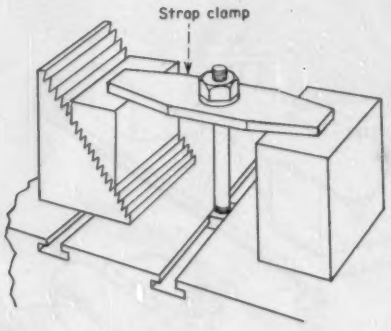
Bolts, screws, nuts, and other pieces of equipment used with standard clamps are commonly known as "furniture," and it is not unusual to employ common bolts and nuts for such work. However, for maximum safety and convenience it is better to use bolts and nuts made for the purpose. These are made from specially selected steel, accurately machined, and heat treated for high tensile strength, and with rectangular heads to fit into standard T-slots. Some types have an extension on the head to fit closely into the narrow part of the T-slot, others have a narrow head to allow them to be inserted through the narrow slot, then rotated to hook under the slot flanges. This avoids the necessity of sliding the bolt all the way down a slot, and clearing out the chips ahead of it. If it is desired to employ studs or capscrews, special T-slot nuts are used.



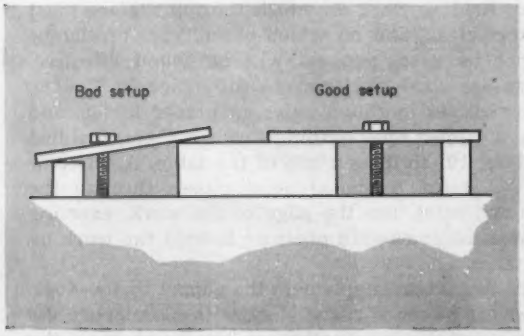
SPECIAL BOLTS AND NUTS are required for holding clamps and for attaching vises and other holding fixtures to machine tables



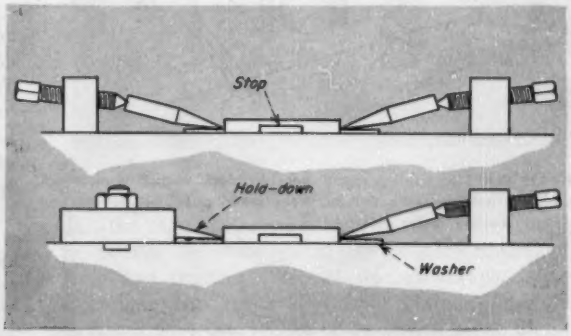
EDGE HOLDING can be done by using poppets and toe dogs, the latter for holding extremely thin work, when top surface must be unobstructed. End stops help to absorb cutter thrust, prevent work from slipping



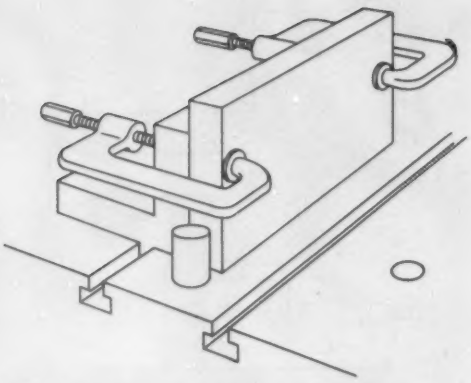
MATCHED PAIR of heel blocks offers quick and easy method of adjustment for work height. Single blocks with square steps may also be used



HEEL BLOCK must be at least as high as the work, and bolt must be located closer to the work than to the block, to obtain secure, non-slipping grip on work

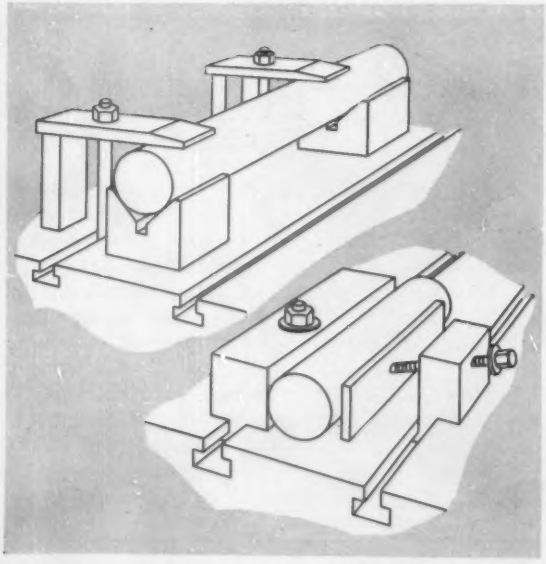


ALTERNATE METHODS of holding thin work between two poppets and toe dogs (top) and between poppet and toe dog and parallel and hold-down (bottom). Note use of washer under toe to avoid damaging table



ANGLE PLATE AND C-CLAMPS offer an easy way to hold work to be machined on one edge. Use of an end stop is imperative in such a setup

SCREW JACKS provide support for thin sections and overhung portions of work, and avoid the danger of flexing or breaking under the pressure of the cut



ALTERNATE WAYS of holding round work. V-block method is more common, but holding work flat on table, when possible, prevents work from bending under cut

Setting up a job with standard clamps is relatively simple, but certain precautions must be observed. Raise the heel of the clamp as high as, or preferably slightly higher than, the toe, so there is no tendency for the work to slide away from the clamp. And position the bolt as close to the work as possible. Heel supports are often old pieces of junk picked up around the shop, with two or three washers piled on top to reach the desired height. This makes for a poor setup and often causes considerable loss of time in hunting for just the right pieces of scrap. Far better results can be obtained by using proper step-blocks. Sometimes these are made in matched pairs with the steps cut at an angle to prevent slipping. By sliding one block up or down the other, adjustments for height can be made in small increments.

For holding work on which the top surface must be kept clear, and on which other types of clamps cannot be used, poppets will be found effective. These are steel blocks made to engage in T-slots, or sometimes in round holes on planer tables, and have a tapped hole running through them, inclined at about 10° to the surface of the table. A setscrew with a sharp, hardened point passes through the hole and bites into the edge of the work, exerting a powerful downward pressure to hold the work on the table.

For thin work, supplement the poppet by toe-dogs. These are pieces of round stock with a conical recess at one end to engage the setscrew, and have the other end flattened to a broad, chisel-like edge. Always use a piece of thin metal, such as a washer, under the toe to prevent the clamp from digging

into, and damaging, the machine table. A variant of the toe-clamp is in the form of a straight pin, pointed at one end and with the other end rounded to fit against a hollow-point setscrew in the poppet. When using this type of clamp, make sure the poppet rests squarely on the table surface, and that the toe dog and poppet screw are aligned horizontally. Avoid excessive pressure, or you may buckle the work.

Toe dogs and poppets can be used in pairs—on both sides of the work—or one side of the work may be butted against a parallel strip bolted to the table. If this parallel will interfere with the cutter, place a hold-down between it and the work. A hold-down is a wedge-shaped strip having its back face machined at a slight angle from the vertical to produce a downward pressure when work is forced against the thin edge.

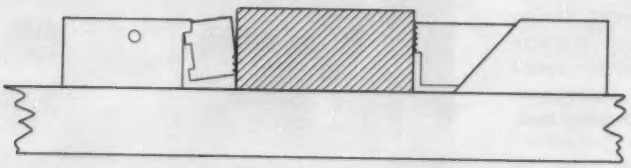
For extremely thin work, such as sheet metal, double-faced adhesive tape will hold against moderate cuts. This is similar to conventional masking tape but has adhesive on both sides. For light grinding cuts, other adhesives, such as shellac, can be employed, but they are somewhat awkward and messy to apply and remove.

For machining the edges of work, it is often possible to clamp it against a parallel strip with C-clamps or poppets, or against an angle plate with ordinary C-clamps, parallel clamps, or by bolts through some convenient opening. An alternate method is to raise the work above the surface of the table by supporting it on parallels and clamping in the conventional manner. Raise it just enough to permit the cutter to clear the table top; excessive height tends toward wobbly setups.

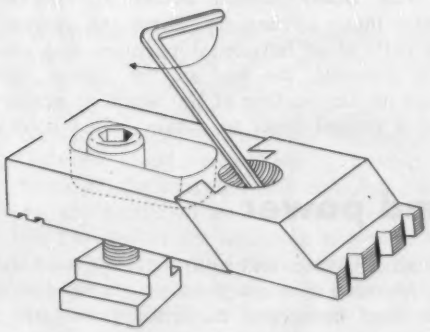
Round work is best supported in V-blocks and held down with conventional clamps, although an alternate method is to place it directly on the table with one side butted against a degree strip and with pressure applied on the opposite side by poppet screws bearing on a flat strip.

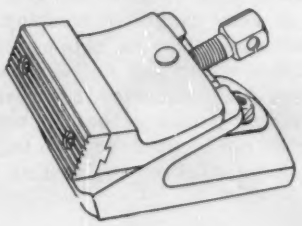
In any kind of clamping setup, it is always advisable to make use of an end stop to prevent endwise movement of the work. This can be a simple block bolted to the table, or a device similar to a poppet but with a round-end setscrew passing through it parallel to the table.

Avoid clamping on thin, unsupported sections but, if this is unavoidable, support such sections by screw jacks. Use these also under overhung parts of the work to prevent their deflecting under the pressure of the cut, but be careful not to apply too much jacking pressure, or this may cause deflection in the opposite direction. Similarly, don't use excessive pressure in clamping; it isn't necessary to slug the wrench with a hammer—you will either break something or set up stresses in the work that will cause distortion when pressure is released.



Special clamps





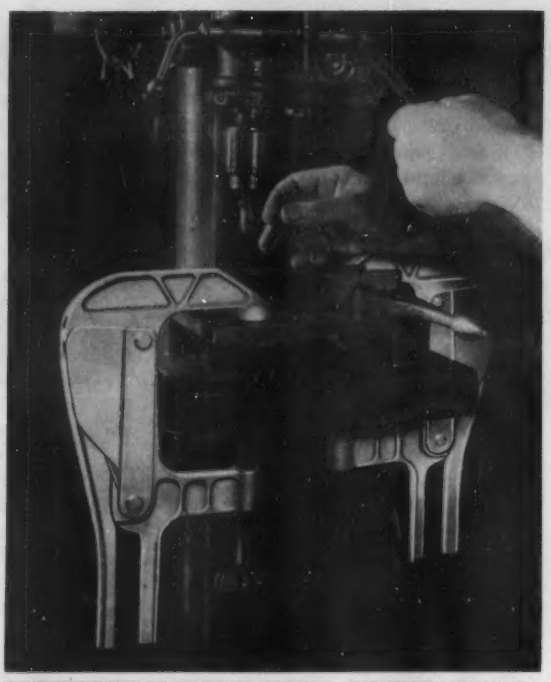
SPECIAL PATENT CLAMPS offer fast operation and extraordinary gripping power by their in-and-down action

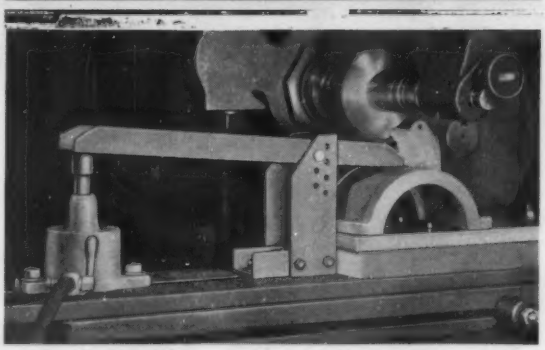
All the standard clamps described above involve a number of separate pieces and require considerable time and ingenuity to set up advantageously. To overcome this, several special clamps have been devised. One consists of a hardened steel block to be bolted to the machine table and carrying a sliding member dovetailed to it. By means of a socket-head screw, the sliding member is caused to move forward and down, exerting a powerful gripping pressure

TOGGLE-ACTION C-clamps provide tremendous holding power and vibration resistance, and are less likely to mar the work than screw-type C-clamps. Toggle pliers can serve as a substitute for a vise for light work

against the edge of the work. These clamps may be used in opposing pairs or against a counter-clamp consisting of a block which carries a hinged, spring-loaded jaw. The in-and-down action of the counter-clamp lip, combined with the in-and-down action of the clamp, holds the work against the table with up to six tons pressure. A somewhat different design by a different manufacturer employs an angular casting for the base, with the sliding member operated in dovetail ways by a projecting jackscrew. Both types can be employed on any machine tool, including lathe faceplates.

For some jobs, ordinary C-clamps can serve to hold work down on a table or against a parallel. However, the operation is rather slow, the grip uncertain, and there is some danger of marking the work surface. Better results can be obtained with toggle-action C-clamps which can be adjusted to approximate opening, then squeezed to create a positive lock developing a load of over a ton. A similar gripping action can be obtained with toggle-action pliers for holding work during routing and other operations.





AIR-OPERATED CLAMPS can be applied directly to the work, or against a lever arm for greater convenience or holding power

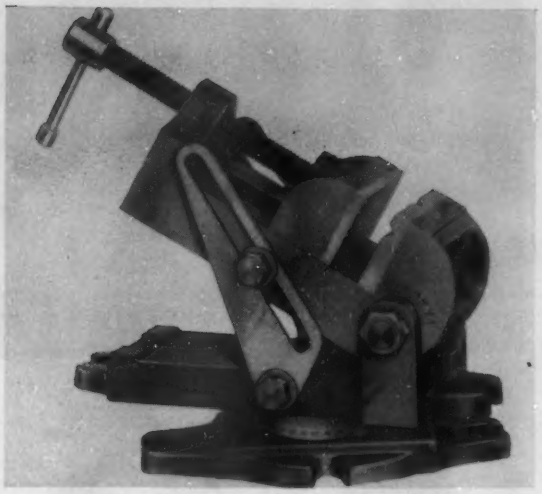
For fastest possible action, air-operated clamps offer many advantages. These can operate in either a vertical or horizontal position, and can function by pressing the end of the piston rod directly against the surface of the work, or against one end of a hinged lever to obtain added holding power.

Vises--hand and power

From the standpoint of ease of operation, simplicity, and wide field of application, the standard machine vise is probably the most commonly used work-holding tool. Although there is an almost endless variety of patterns, the machine vise consists, in general, of a flat base and two jaws. One jaw is fixed, the other can be moved in and out by a screw, cam, or power cylinder. In most cases, the base is equipped with keys to align it with T-slots in the machine table, and with slots for hold-down bolts.

Machine vises are precision-made, with accurately finished bases and hardened jaws, and will hold work true and square within close limits. So handle them with respect, and take care not to drop them on the floor, or run the cutting tool into them. Keep them cleaned and oiled, and avoid overloading; that is, don't use a little vise for a big job, and never use a hammer on the handle of a vise.

Milling-machine vises



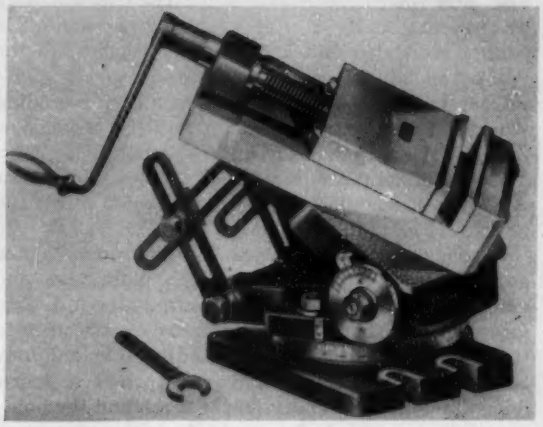
ANGLE VISE combines swiveling and tilting action for cuts in two planes. Vise may be removed from base and used as simple angle vise, if desired

For many plain, straightforward milling operations, the plain machine vise is entirely satisfactory. It is bolted directly to the table and located by keys which fit into the T-slots. It has the particular advantage of minimum height above the table. The conventional type has the fixed-jaw support integral with the base, the movable-jaw support sliding in ways and being advanced or retracted by a screw operated by a removable handle. Depending on the type of construction, the screw may operate in a renewable bronze nut in the movable-jaw support or, in smaller sizes, the support itself may act as the nut.

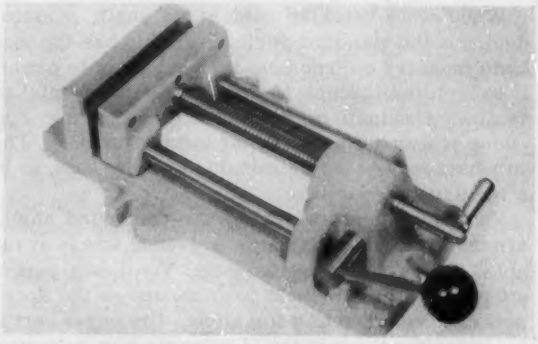
Jaws are made of tool steel, hardened and ground, and are renewable. In some cases, one jaw may have one or more horizontal and vertical V-grooves for convenience in holding round work. Special jaws can also be obtained for holding work of irregular shape, including pivoted types for holding tapered work.

Somewhat different is the type designed for holding rough work. It consists of a pair of notched bars attached to a solid jaw, a movable jaw, and a screw holder. The screw holder may be set in any notch along the bars to give the approximate desired jaw opening. Then the short screw bearing against a hardened block on the movable jaw completes the clamp. Jaws are hardened and serrated, and the movable jaw can swivel for clamping non-parallel pieces. A similar design is also made in a precision type, without the swiveling jaws, with smooth jaw faces for use principally on drillpresses.

More generally useful is the swivel vise in which the vise body is mounted on a base graduated in degrees. The base is mounted on the table in the usual way, and the body of the vise may be rotated through a full circle to permit milling at any angle. If desired, the vise body may be removed from the



TOOLMAKERS' UNIVERSAL VISE is adjustable in three planes to permit making cuts in even the most awkward positions. It is not intended for production work



COMBINATION SCREW and cam-action vise provides easy adjustment for work size and quick locking by cam action

base and used as a plain vise, keyways and flanges being provided for this purpose.

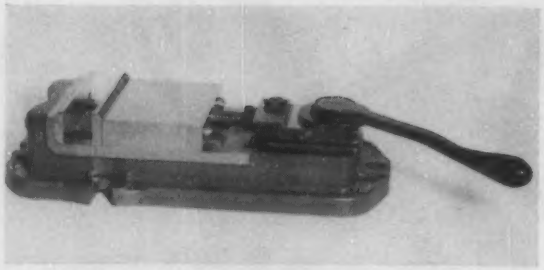
For fast operation, cam-operated vises are particularly useful. In one type the fixed jaw is attached to the mid-section of the bed, and the movable jaw at the end of the vise has a tongue which extends under the fixed jaw. The cam pivot is clamped to this tongue and, by loosening the nut on the pivot, its position can be adjusted lengthwise on the tongue. The cam works against the fixed jaw, causing the movable jaw to advance. In a different type, the fixed jaw is at the end of the vise, as in a regular vise, and the movable jaw is attached to a sliding block actuated by a cam which works against a sliding crosshead. The crosshead is attached to the jaw by an adjusting screw.

Cam vises are employed principally for holding work of the same, or approximately the same, size. The jaw opening is adjusted to suit one piece, then a short horizontal movement of the lever opens or closes the jaws sufficiently to remove and insert the next piece.

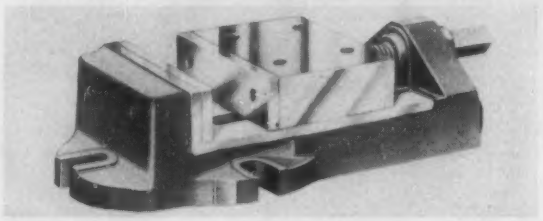
A somewhat different type has the movable jaw adjusted by a long screw, as in a plain vise, and employs a cam to apply end pressure to the nut. Cam movement is short, so pieces must be of uniform thickness. Pressure, however, is adjustable, and may be varied from a few pounds to two tons or more, depending on the fragility of the work and the holding pressure needed. For work of varying thickness, a variant of this type is supplied with a plain rod by which the movable jaw is advanced to contact the work. A movement of a cam lever then locks the work with a pressure of some two tons.

When work must be held at an angle, a useful device is the standard angle vise. This has the vise body mounted on trunnions on a sub-base to permit it to be tilted through any angle from horizontal to vertical. Graduations permit accurate setting, and clamp screws are provided for locking the body. The sub-base may be swivel-mounted on the base, as in a regular swivel vise.

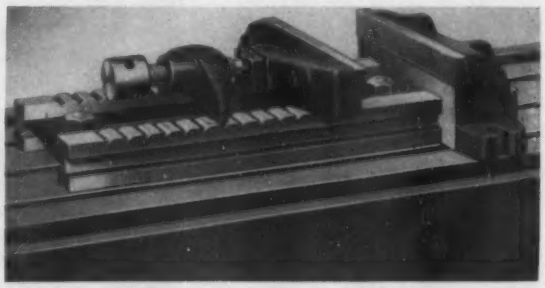
For toolroom work, and where compound angles are involved, the toolmakers' universal vise is available. This has a two-piece base. The lower part is attached to the table and is graduated so the upper part can be turned in a full circle. The upper part is hinged, after the manner of an angle vise, to permit adjustment through 90° in a vertical plane. In addition, the vise body can be swiveled on the upper surface of the hinged knee and set at any angle to the axis of the knee hinge. These vises can be set at any angle and the work positioned and removed without disturbing the setting. They can also be moved easily from one machine to another, and several operations performed without removing the work.



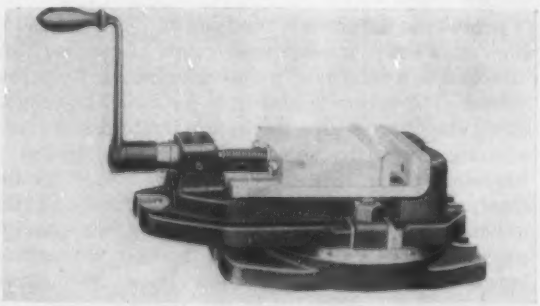
CAM-ACTION VISE can be locked by short movement of handle, is suitable only for repetitive work on pieces of the same thickness



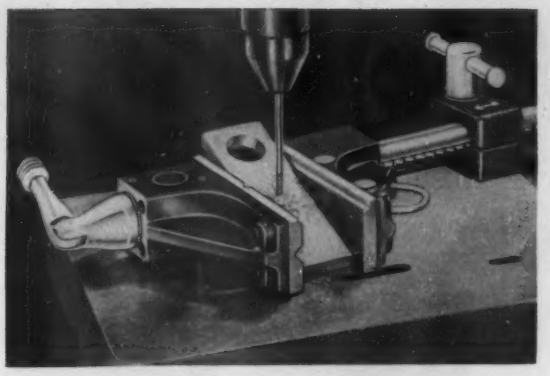
PLAIN MILLING-MACHINE vise is well suited for a wide variety of straightforward operations; its low height is often an important advantage



FAST-ACTION VISE quickly adapts to a broad range of work sizes. It is available with serrated jaws for rough work, smooth jaws for finished work

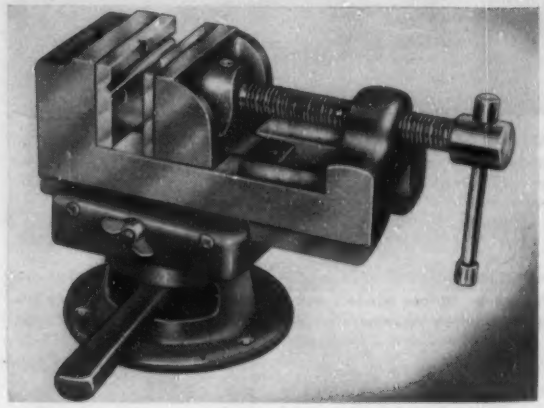


SWIVEL VISE can be adjusted to any desired angle by graduations on base, or removed from base to serve as a plain vise

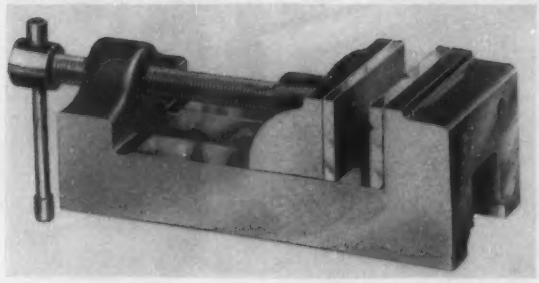


SPECIAL VISE is pivoted to corner of drillpress table and locked by quarter-turn of lever. Jaws can be used in horizontal or vertical position, and can overhang table edge for long work. Down-acting pressure also permits holding sheet metal on table surface

Drillpress vises



BENCH MOUNT for drillpress vise facilitates setup of work on the bench and subsequent removal of the vise body to the drillpress without disturbing the work



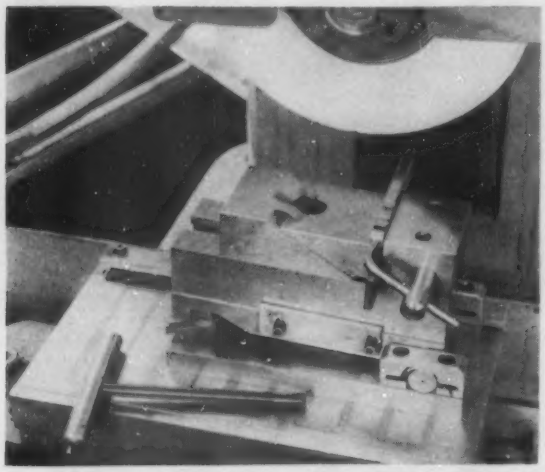
SIMPLE DRILLPRESS VISE is precision-finished on base, both sides, and one end to permit its use in the position best suited to the work

All the vises described above can, of course, be used on a drillpress. However, there are many occasions in drilling when it is desirable to move the vise around on the table to position it under the drill. Milling vises are somewhat heavy for this purpose, so special drillpress vises are made. These have no flange or hold-down lugs, but are accurately machined on the bottom, both sides, and one end. They will slide freely on the table, and can be turned over on the end or sides for maximum convenience, with assurance of absolute squareness with the base.

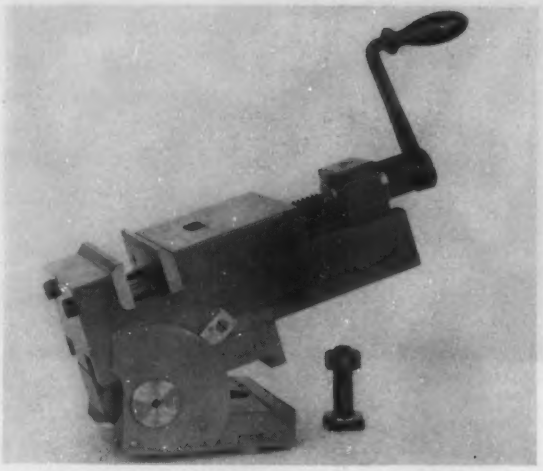
One such vise is furnished with a swivel mount to be fastened to the workbench. Work can be set up on the bench, then a locking screw loosened and the vise removed from the mount and transferred to the drillpress without disturbing the work.

One danger with the standard drillpress vise is that, being free to move, it may shift slightly during a cut or, if the drill binds, may spin and injure the operator's hands. These hazards are overcome by a special type of safety vise in which both jaws are carried on a single tubular member which also houses the screw. One jaw is fixed at the end of the tube, the other slides along it for quick adjustment and is tightened by turning the screw. The opposite end of the tube is held in a clamp attached to the back corner of the drillpress table. With the clamp unlocked, the jaws and work may be positioned as desired—even overhanging the table for long work. When the clamp is tightened the unit is locked positively in position and, because of the design of the clamp, is pressed down hard on the table. This latter feature makes it possible to use the vise as a hold-down for drilling sheet metal. The jaws may be used in a horizontal or vertical position, and the entire unit can be swung out of the way to leave the table clear for other work.

For holding work on a bandsaw, a variant of this design is equipped with a twist-grip at each end of the tubular member. A twist of either grip locks or unlocks the work, and the handles provide a safe, firm grip for guiding the work for sawing.

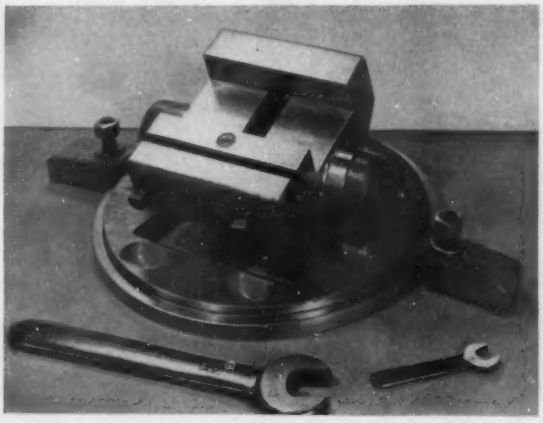


SPECIAL GRINDING VISE for mounting on magnetic chuck has in-and-down gripping action and built-in sine bar. Adjustable stop provides endwise location. Fixed jaw has V for holding round work; movable jaw swivels for gripping tapered work



ADJUSTABLE VISE for light grinding work is held on table with a single bolt, positioned by a tongue fitting in table T-slot. Renewable jaws are hardened-and-ground tool steel

ADJUSTABLE SWIVEL VISE can be rotated in two planes, is designed for use on surface grinders and for other light work. Movable jaw is actuated by setscrews



Grinding vises

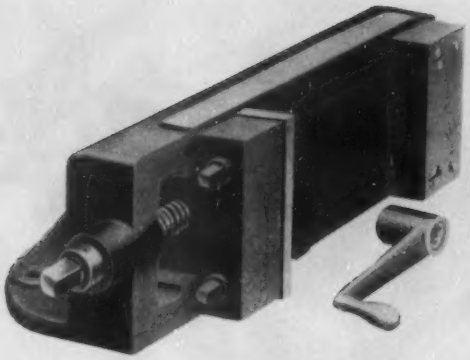
As with drillpresses, standard machine vises may be employed on grinders, but some special types have been evolved specially for the purpose. One of these is similar to a standard angle vise but does not have the swiveling feature. It is fastened directly to the grinder table by a single bolt and is positioned by a key in the table T-slot. The body can be adjusted to any angle from horizontal to vertical.

For surface grinders and other light work, an adjustable swivel vise may be employed. This attaches to the table by two clamps and can be rotated as desired. The angle, however, must be set by a protractor or other means. The vise proper is pivoted so it can be set at any angle up to 45° either side of horizontal by a graduated arc. The movable jaw is actuated by two setscrews.

Special vises

For use on the vertical shaper, a special side vise has been developed. This is similar to a plain milling vise, but is designed with a flange on one side for mounting with the jaws in a vertical position.

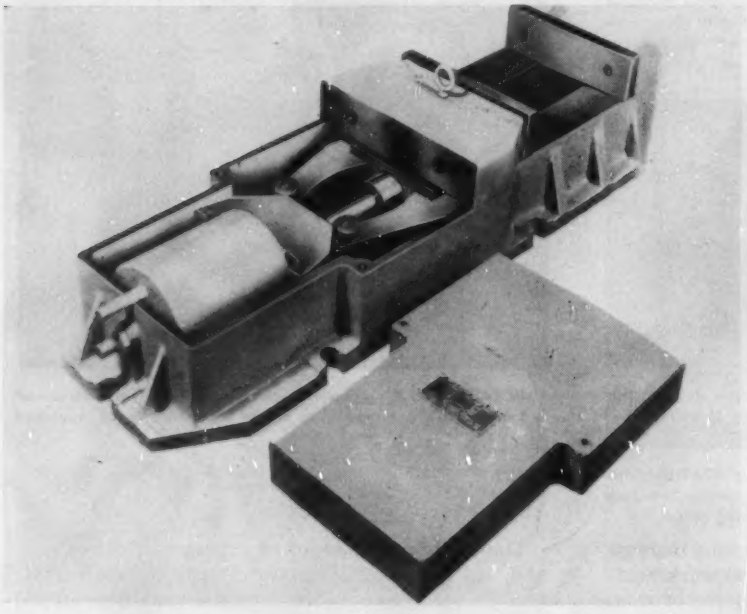
Of unusual construction is the so-called half-vise, that can be used on virtually any type of machine having a T-slotted table. It consists of a hardened block to be attached to the table, having two hinged lips normally tilted slightly upward. The lip on one side is deep and is for holding relatively high work;

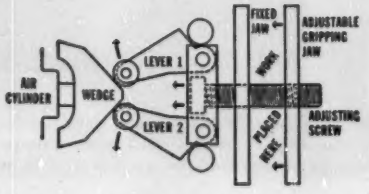


SLOTTER VISE has side mounting flange and is intended for use on a vertical slotter, although it can be used on other machines

the one on the opposite side is shorter and is for holding low work that must rest on the parallel that forms a part of the center block. One end of the work rests against the lip and pressure is applied at the other end by one or more special clamps that provide an in-and-down action. These are described above under "Clamps." The pressure forces the lip in and down and the combined action holds the work against the table and absolutely parallel.

HALF-VISE has spring-hinged lip to provide in-and-down gripping action when used in combination with special in-and-down-acting clamp

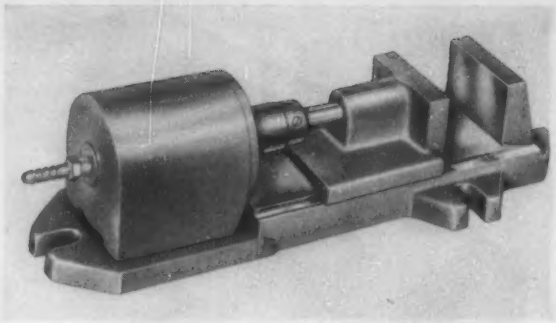




AIR-OPERATED VISE with wedge and lever action provides exceptional holding power for heavy work. Vises of this type may be air- or hydraulically operated

Air and hydraulic vises

Where speed is important, and the minimum amount of manual effort is desired, power-operated vises can be employed on virtually any machine tool. They can be operated by hand or foot valve and have extremely rapid action and a powerful grip. One particular advantage is that they can be oper-



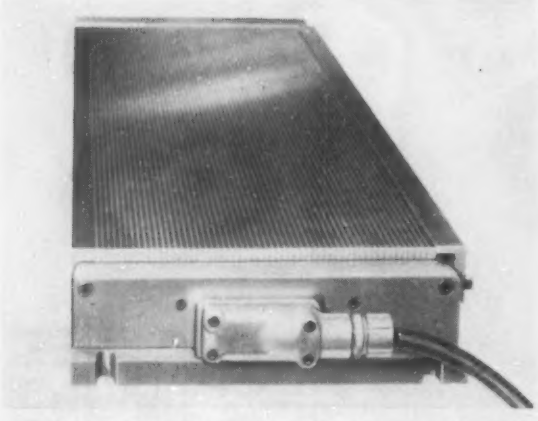
PNEUMATIC DRILLPRESS VISE has adjustable stroke length to avoid excessive opening and danger of pinched fingers. Operation is thus speeded up and air consumption reduced

ated manually or synchronized with the movement of the machine table or tool to provide automatic operation.

Pressure may be applied by direct thrust from the cylinder, or may be multiplied by wedge-and-lever action when exceptional gripping power is required, as when carbides or hardened steel are milled.

One advantage peculiar to power vises is that, having live power behind the movable jaw, there is no tendency for the grip to loosen under vibration. In the event of power failure, jaws will remain locked until pressure is released by the valve.

Magnetic and vacuum chucks

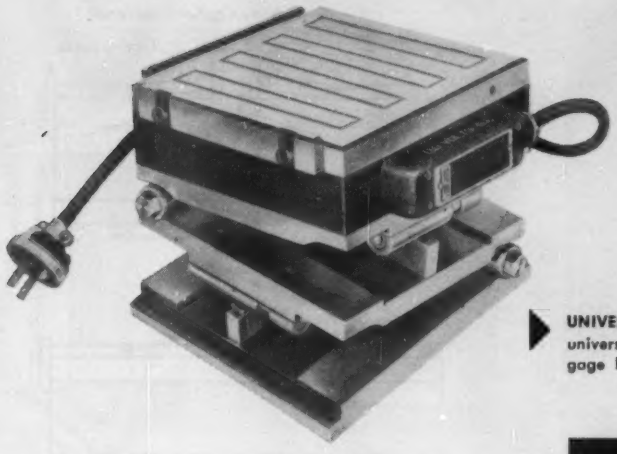


ELECTROMAGNETIC CHUCK with closely spaced poles designed for holding large number of small parts. Arrangement of poles varies with the class of work for which it is to be used

ADJUSTABLE-ANGLE magnetic chuck can be tilted from horizontal to vertical to suit the position of the work face to be machined

Recent years have witnessed a tremendous increase in the use of magnetic chucks for general work holding. In their early days, these chucks were of relatively light holding power and their use was confined to such operations as surface grinding. Today, however, the holding power has been increased to such an extent that they are being used with complete success on heavy milling jobs. Waterproof construction makes them applicable on either wet or dry machining, and they are available in either electro-magnet or permanent-magnet styles.

The electric type requires a source of direct current, but this is not a serious obstacle, as small rectifiers are readily available. They are usually equipped with a simple on-and-off switch, but some makes incorporate a rheostat so the gripping power can be varied to suit the work. When the switch is off, work can be removed, but there may be some residual magnetism in the work itself which causes it to stick. In such cases, the work can be removed by sliding it across the chuck face. It should then be demagnetized by passing it through a demagnetizer.

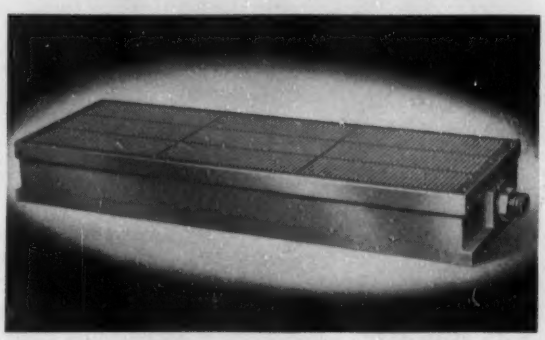


UNIVERSAL sine-bar magnetic chuck corresponds to toolmakers' universal vise. Built-in sine bars permit angular adjustments by gage blocks to the closest limits

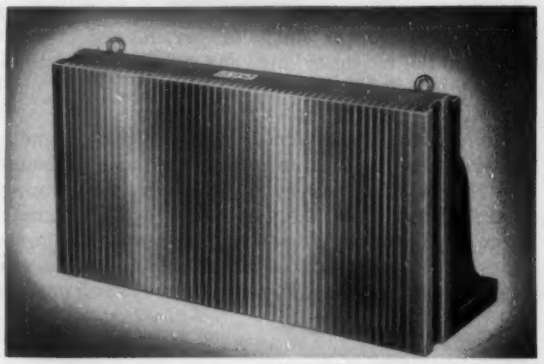
Many models, however, now incorporate a demagnetizing switch designed to permit a brief surge of current in the opposite direction to remove magnetism.

Permanent-magnet chucks have a lever or turn-button which displaces the magnets under the top plate. In the On position, the magnetic flux goes through the work to complete the circuit; in the Off position, the flux completes its circuit through the top plate without going through the work. These chucks never heat up, and work can be left in place as long as desired without injury to work or chuck. The holding power is adjustable by partial movement of the lever, from zero to maximum. This is an advantage for certain jobs where light holding power only is needed to prevent distortion.

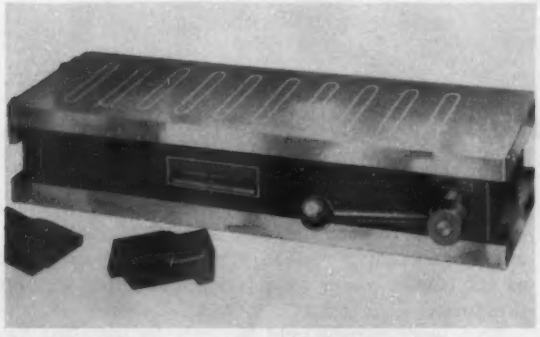
Most work can be held by merely placing it on the top of the chuck and turning on the power, and it makes no difference whether one or many pieces are held. However, if extremely small pieces are to be held, choose a chuck with closely spaced magnets, or use an auxiliary top plate made of narrow steel strips alternating with non-magnetic spacers. In some cases, improved holding can be obtained



VACUUM CHUCK offers the best means of holding flat, non-magnetic work, such as glass, aluminum, and plastic. Holes not covered by work must be blocked off to avoid loss of holding power

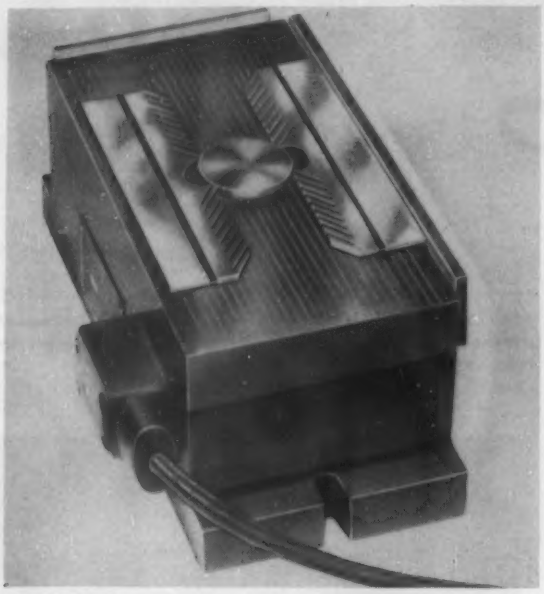


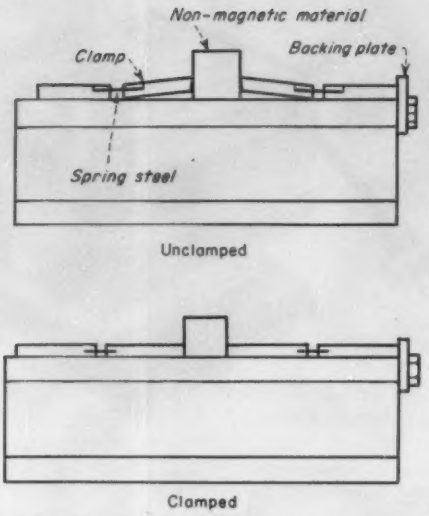
VERTICAL-FACE magnetic chuck is particularly suited for holding work during face milling operations. Holding power is sufficient to permit taking heavy cuts



PERMANENT-MAGNET CHUCK for relatively light machining operations. Gripping power can be varied by movement of handle. External power source is not required, and chucks will not heat up under any conditions

by employing straightedges to position the work and provide edge holding (*AM*—May 12 '52, p127.) For round work, special V-blocks made of alternate iron and brass laminations can be placed on the chuck surface. Work which cannot be placed directly on the chuck because of its shape may be supported on magnetic parallels similarly constructed of brass and iron laminations, and cut or shaped to fit the work contour.





MAGNETICALLY OPERATED vise jaws placed on a magnetic chuck provide down-gripping action for holding non-magnetic parts of a variety of shapes and heights

The standard magnetic chuck is designed to be mounted flat on the machine table, but models are also available for edge mounting—for face-milling operations—and with trunnions to permit holding work at an angle. For holding at a compound angle, some types can be tilted and rotated, and for extremely high precision work, a sine-angle model is available. This has a flat base to which is hinged a sub-base that can be raised by gage blocks to produce any angle by the sine-bar principle. On top of this is mounted the chuck proper, hinged at right angles to the sub-base hinge and similarly adjustable by gage blocks to any angle. Such types are most commonly employed in the toolroom.

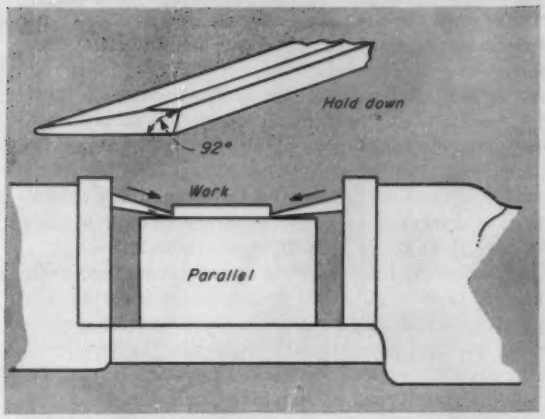
Thin brass, aluminum, and other non-magnetic materials can be held on magnetic chucks, although this is not commonly done. One way is to employ a steel keeper plate on top of the work. The magnetic force pulls this plate down and causes it to grip the work. Another way is to use special magnetic vise jaws. These can grip thin or thick work, and operate on the in-and-down principle. Each jaw consists of two steel sections connected to each other by a preset spring-steel strip. The angle of the spring is such that the two sections are normally at 5° to each other. When work is placed between the jaws and the chuck energized, the movable sections are forced down into a horizontal position, wedging themselves against the work with a powerful in-and-down action.

Probably the best way to hold such work, however, is on a vacuum chuck. These are made in most of the styles available in magnetic chucks and have the top plate perforated with small holes leading into passages which are, in turn, connected to a header. The header is connected by suitable piping to a vacuum pump. Holding power of these chucks is extremely high, but care must be taken to cover all holes, either with the work or with suitable covers, or vacuum will be released through the open holes and much of the power lost. Wood, glass, rubber, and plastics can best be held on a vacuum chuck.

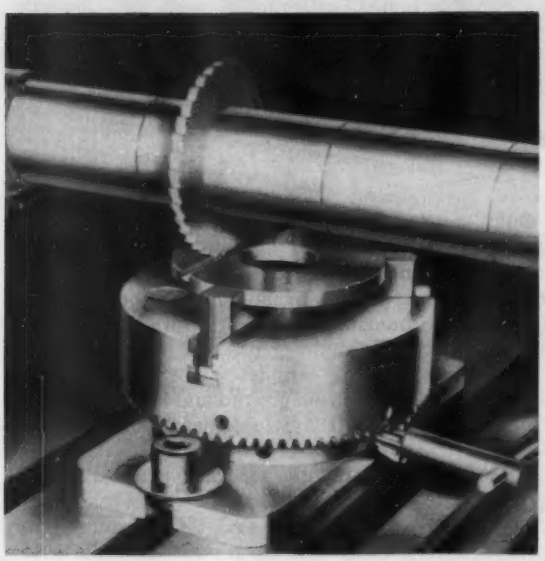
Vise setups

Most jobs can be held directly between the jaws of a vise, although it is sometimes necessary to place it on parallels to raise it above the surface of the jaws. In such cases, make sure the combined width of the two parallels is less than the width of the work to be sure the grip does not come on them. When loading work in the vise, close the jaws firmly, not too tightly, and strike the work a sharp blow with a lead hammer to make sure it is properly seated. Then close the jaws to the final grip by hand pressure on the handle. This is particularly important when holding several pieces at the same time, as the center pieces have a tendency to lift under pressure.

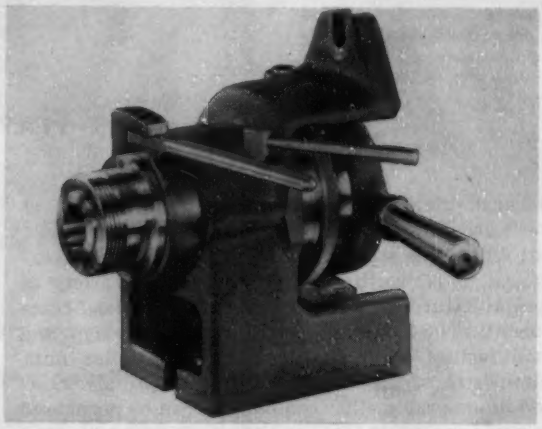
Thin work can be held securely by inserting two hold-downs between the work and the jaws. The angle on the back face of these will produce a down-holding effect when the vise is tightened.



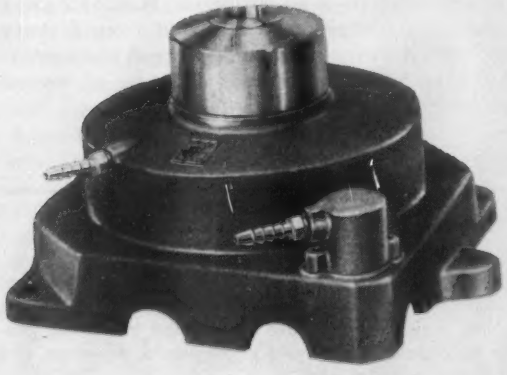
THIN WORK can be held securely in a vise by supporting it on a parallel and gripping between a pair of hold-downs. Note angle on back to produce downward pressure on work



MOUNTING PLATE with threaded boss can be attached to machine table to permit holding threaded-back chuck for gripping round work, and permits transferring work from lathe to other machine without unchucking



COLLET HOLDER and closer permits standard lathe collets to be used for holding and centering round work. It can be used in either horizontal or vertical position and has built-in indexing mechanism

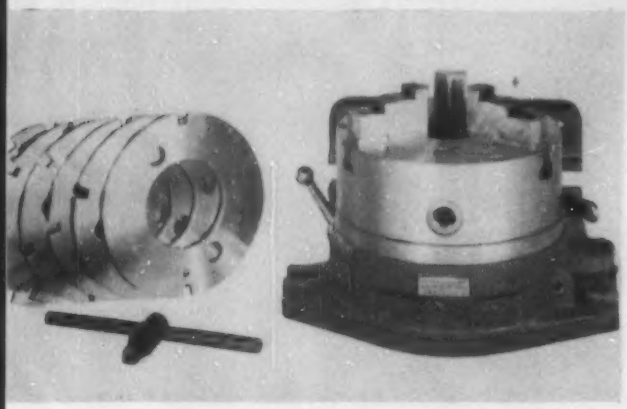


AIR-OPERATED COLLET fixture for vertical work has depth stop and can be equipped with built-in fountain to pump coolant through and around the collet

Jaw chucks and collets

Although chucks and collets are commonly associated with rotary holding devices (*AM*—Oct. 26 '53, p129), they are also employed to some extent for stationary work. They are particularly useful for holding round work in an endwise position. Large chucks are not usually employed for this purpose, but an adaptor plate can be obtained for bolting to a machine table, having a threaded boss on which a small, threaded-back chuck can be screwed. More common is the use of a chuck on a dividing head.

Spring collets provide an ideal means of holding relatively small-diameter work and are applied to stationary operation by means of special collet fix-



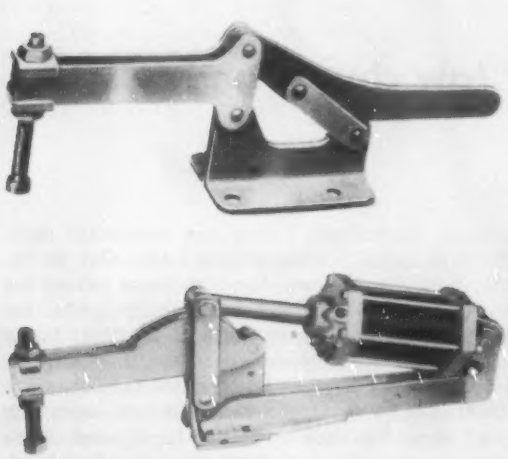
INDEXING SPACER can be used in either horizontal or vertical position and has three-jaw, self-centering chuck to hold the work. Attachment can be applied for drilling spaced holes in a circle

tures. These are made with either stationary spindles or with built-in indexing mechanism to allow the work to be rotated into different positions. They can operate in either horizontal or vertical positions, and may be mounted on a sub-base in conjunction with a tailstock and dead center. Some models incorporate a threaded or taper-nose spindle for mounting jaw chucks and step chucks. The collets are identical with those used on lathes, and the draw-back mechanism is operated by a closer lever having a high leverage ratio or by a built-in air cylinder.

Larger work may be held more conveniently in a special type of indexing device which incorporates its own chuck. It can be used in either the horizontal or the vertical position, and may also be equipped with a collet chuck for smaller work. It can be applied to all types of machines and can be fitted with a drilling attachment for drilling spaced holes in a circle in either horizontal or vertical positions.

Fixtures

Because there are as many different fixtures as there are different workpieces, these do not logically fall within the scope of this Special Report. Nevertheless, it is worth noting that a great variety of special fixtures can be built up from standard components. No longer is it necessary to design and manufacture hand knobs, C-washers, collar nuts, clamp straps, jig feet, and cam clamps; all these, and innumerable other components can be purchased in a wide range of sizes and types. The same applies to drill jigs, which can be purchased "blank," like a dieset, and require only the addition of work positioners and bushings—the clamping mechanism is built in.



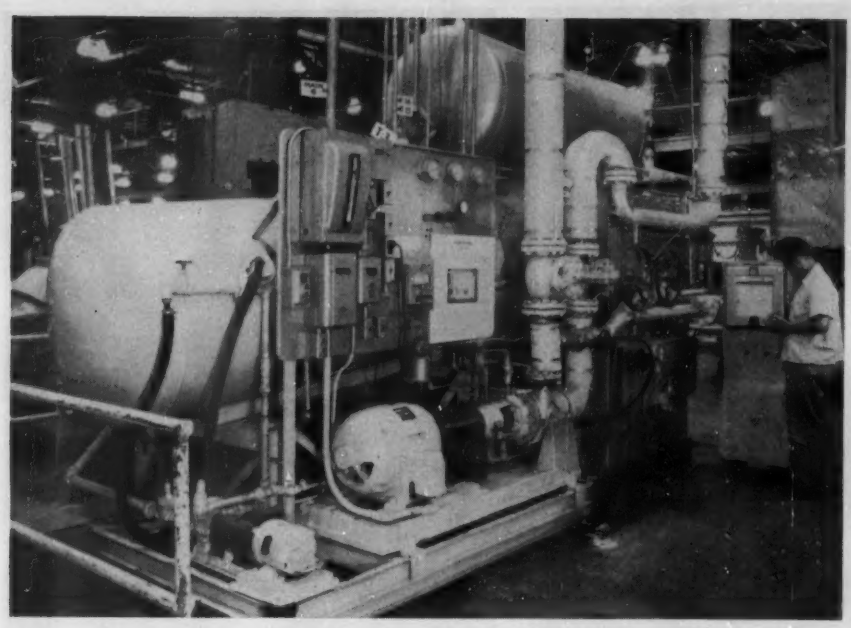
FIXTURE CLAMPS, operating on the toggle principle, are available in either air- or hand-operated models in a great variety of sizes and styles for attachment to fixtures for fast operation

Quick-acting clamps, both manual and power-operated, can be obtained in an almost endless number of sizes and types for attachment to fixtures. Operating on a toggle principle, they permit fast clamping and unclamping of work with any desired pressure and a minimum of physical effort.

More ambitious is a complete set of fixture components made of precision ground and hardened steel which can be assembled on a standard base to create any type of jig or fixture. When only a few parts must be machined, but jig accuracy is necessary, a suitable fixture can be erected in a few hours. After use, it can be disassembled and the parts used to construct other fixtures. If the production order is to be repeated at a later date, the fixtures can be photographed and the components listed before teardown. It is then a simple matter to re-erect the fixture when needed. Another important use for these sets is for constructing prototypes to establish the optimum design for a major fixture. Positioning and clamping difficulties not anticipated from a study of the work drawings may be discovered when erecting the model, and hundreds of hours of wasted labor and material may thus be saved.

We acknowledge . . .

the kindness of many manufacturers—too numerous to mention in detail—who have cooperated in making possible this report by supplying photographs, drawings, and descriptive material.—Ed.



LIQUID-MEDIA HEAT EXCHANGER is gas fired. Heavy, chlorinated-hydrocarbon liquid is heated here and circulated through insulated pipes to the booster stations from which it is supplied to dies

How Rohr heats dies to form titanium

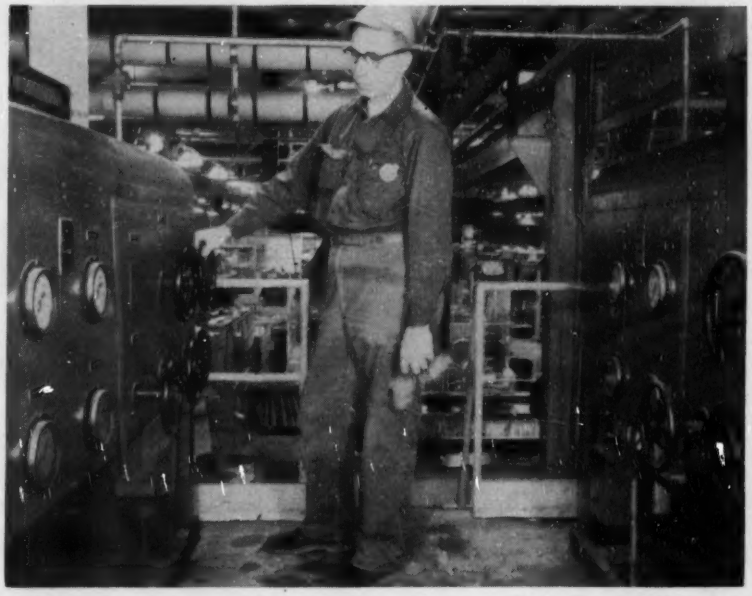
Liquid-media, electric-cartridge, and resistance heaters are among the methods adopted for hot-forming titanium. Because Rohr specializes in engine mountings (and this hot area has been a principal application for titanium), its experience in this new field is relatively great

J E RHEIM, executive vice president,
ROHR AIRCRAFT CORP,
CHULA VISTA, CALIF

Nearly all titanium forming must be done at elevated temperatures. In this it is similar to magnesium, but the temperature range is higher so there are substantial differences in procedure.

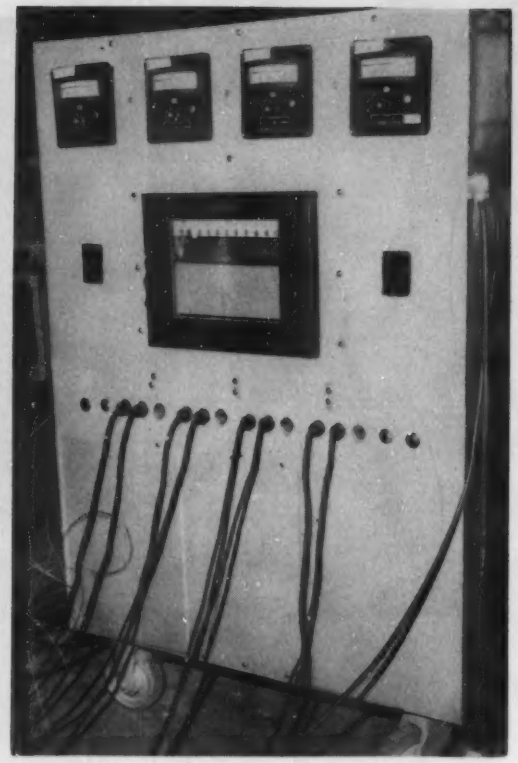
In contrast to a forming temperature for magnesium of about 400 to 500 F, commercially pure titanium is formed from 400 to 700 F, the alloys at 800 to 1000 F. Heat is desirable not only because the amount of cold forming possible with titanium's hexagonal crystal structure is severely limited but because it is difficult to obtain consistent springback.

The lack of uniformity in strength, finish, and general quality of titanium stock currently available makes it difficult to allow for



SECONDARY CONTROL is provided at two booster stations (each serving one set of dies) from which the hot liquid is supplied at required temperature

ROPE-DROP HAMMER has cast-iron (Meehanite) lower die heated by liquid circulated through tubes cast in die. Unheated punch is made of lead. When forming in upper temperature range, punch is covered with thin stainless sheath to avoid excess softening



MOBILE POWER SUPPLY for electrically heated forming equipment supplies power to cartridge heaters inserted in drilled holes in dies

springback in dies and produce consistent parts. Hot forming minimizes this difficulty.

Dies are generally made of Kirksite for working at temperatures which vary according to thickness of the metal. In some cases it is necessary to use Meehanite in the higher temperature range. Because of the tendency to gall, dies must have as smooth a finish as possible.

Two methods have been adopted for heating dies at Rohr. Where high rates of heat input are required, as in large dies, a liquid medium is used for heat transfer. For lower input rates or for more even temperature distribution in small dies, electric-cartridge heating units are better.

For liquid-media heating, a gas-fired American Hydrotherm unit heats the chlorinated hydrocarbon (Monsanto's Aroclor 1200 for temperatures to 650 F; other liquids are available for higher temperatures). Hot liquid is piped to booster stations where it can either be heated further or mixed with cooler liquid to provide accurate temperature control of liquid piped to the dies. Each die is cast with integral heating pipes to circulate the liquid through the body of the die.

For electric heating the dies are drilled in the proper spots to receive cartridge heaters. Power is supplied from mobile transformer and control units.

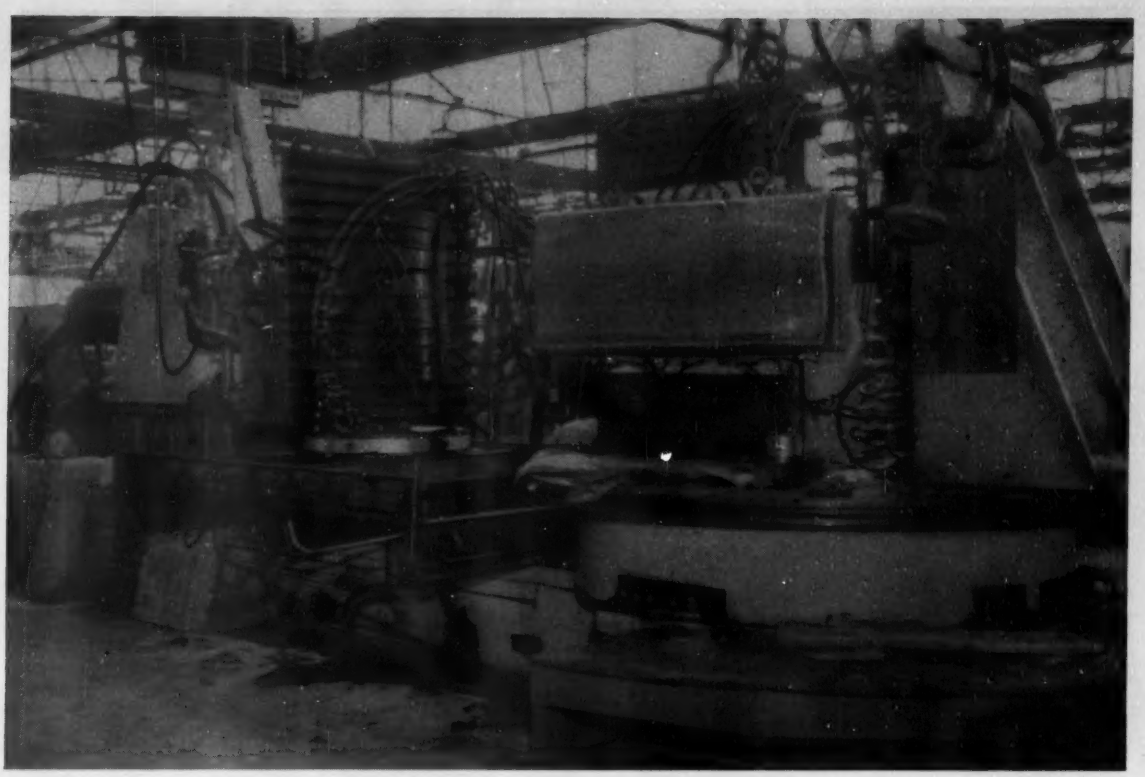
Normally the stock is heated before it is placed in the die, but the high temperature required and the rapid heat loss from thin stock makes the die a major source of heat to the work during forming.

Thus in stretch forming, where there is limited contact between work and die at the start of the operation, it is necessary to pull very slowly to permit the die to reheat the work just ahead of the contact point before that portion of the work is stretch formed. In some cases the load is applied and the work formed by creep, applying more heat if required.

In stretch-forming sections that have previously been brake wrapped to a U- or Z-section, it has been found possible to resistance-heat the work. Work is insulated from the jaws of the machine; current through the work is supplied by a welding transformer with temperature checked by a surface pyrometer.

Limited forming is possible by the Guerin process, with electric heaters in the form block. Temperature is limited to about 650 F. Protection for the large rubber pads is provided by a synthetic-rubber shim pad.

Under a Research & Development project, the working area of one press has been enclosed at the exit end of a conveyor furnace in which sheet is heated. Shielded arm openings permit the operator to reach through the transparent enclosure and manipulate work into and out of the dies with tongs. While the enclosed working area is not as hot as the furnace interior it



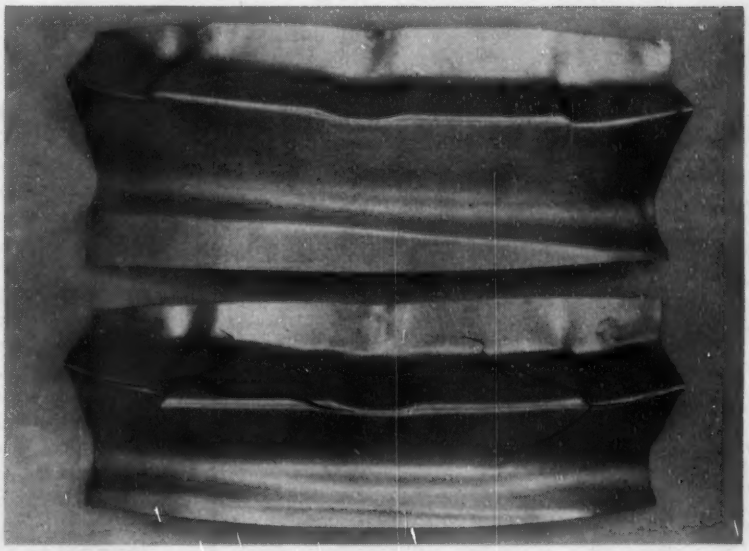
STRETCH BENDER equipped with electric cartridge heaters applied to clamps and form block

does pick up enough heat to appreciably retard cooling of thin sheet.

All rubber forming and some hammer and press work are done dry. Where forming involves any pinching on the dies, lubrication is required. Conventional lubrication is not suitable and Rohr has had best results to date from Warren's Plastilube. Molybdenum disulphide is satisfactory in the forming operation but acceptable methods of removing it from the titanium after forming have not been developed.

Handwork on parts is generally not possible. Attempts to compress a wrinkle out of a flange usually result in making it larger, though it is sometimes possible to shift a wrinkle past the trim line.

Yield strength of titanium is so close to ultimate strength that work must be done in a narrow range. Lack of uniformity of material makes it necessary to sample every sheet with tensile and yield tests. Results of these tests are sent to the shop to determine machine settings.



TITANIUM STAMPING formed in a drop hammer. Upper part was formed hot (work and die both heated) while cracked part was formed cold in same die

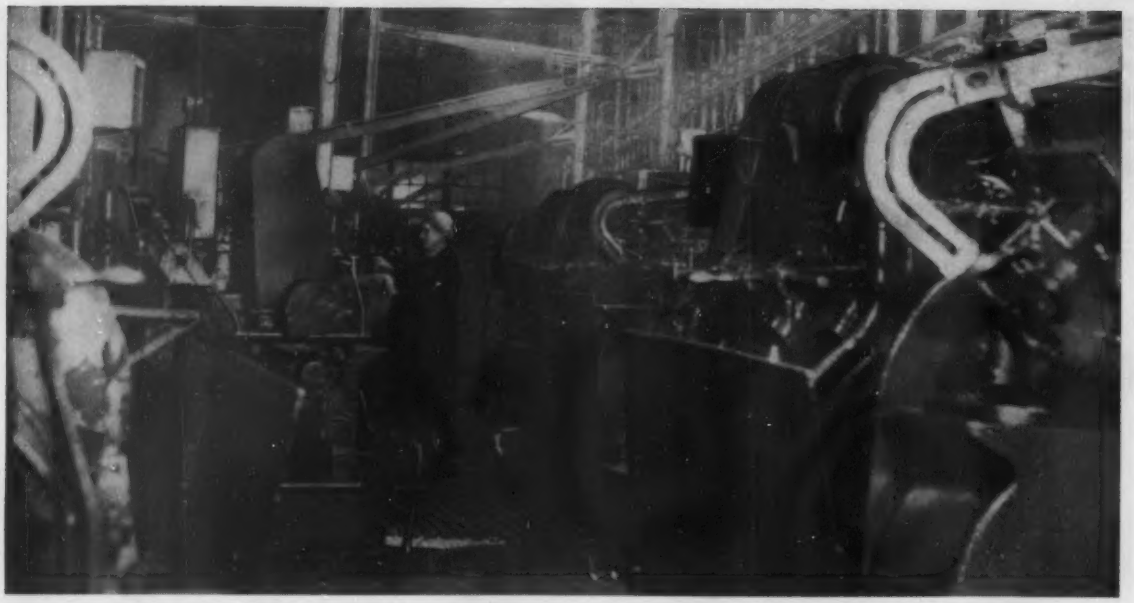


FIG. 1... Automation is applied to this group of automatics. Trunk conveyor is suspended 10 ft from the floor. Tributary chutes take the races to the loading device on each machine.

Russians apply automation to

Russia's policy of rigid standardization in its vehicle industry, coupled with ambitious production targets, has resulted in automation for mass-producing components common to its narrow range of trucks and tractors. Recently, details have come from behind the Iron Curtain on an ingenious automation setup for producing bearing races, claimed adaptable also for pistons and wrist pins

DAVID SCOTT, LONDON, ENGLAND

Feature of a Moscow bearing plant, as described by its designer, V A Morozov, is the addition of automatic control to existing machines and the mechanization of materials handling to provide what are virtually automatic production lines. The setup is notable in that many of the multi-spindle automatics so equipped were not only old—they had been in use for 20 years, or so—but were of several different makes. These machines were completely rebuilt, and in the course of their reconstruction equipment for automatic loading and unloading was incorporated.

There are 40 automatics in the plant—four- and six-spindle chuckers. Each is now equipped with a mechanical loading device and is linked to an overhead multi-channel conveyor by tributary chutes, Fig. 1. The principle is also being extended to grinders. In this way, there has been built up what is described as a "group-type production flow line." It is characterized by parallel, rather than consecutive, operations on these standard machines, with automatic control and mechanical handling between them. One of the advantages of this approach over straightline flow is the reduced danger of a complete breakdown in production.

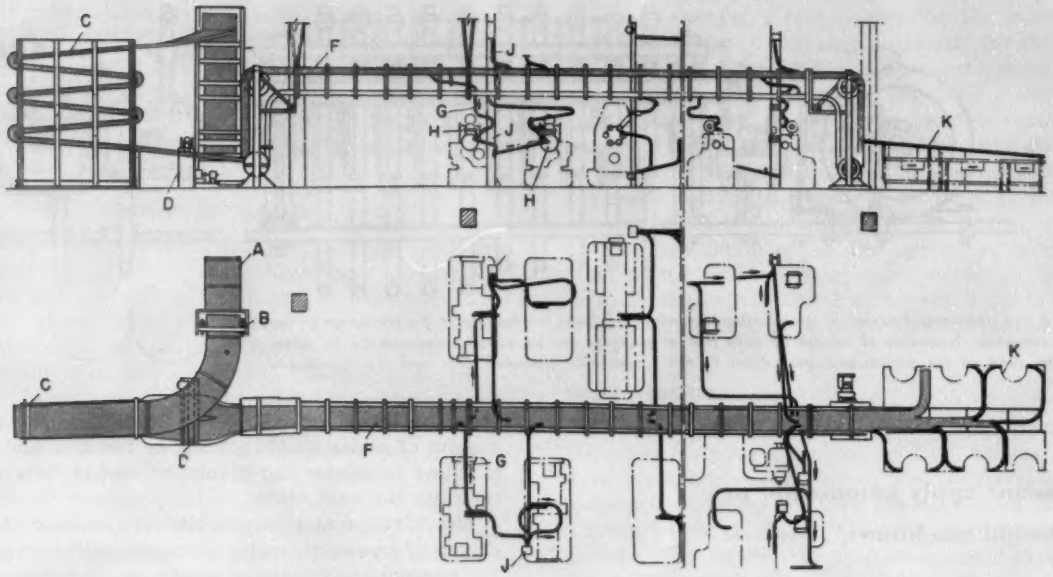


FIG. 2 . . . General layout of the bearing line and the automatic handling equipment. Indicated here are: *A*—Sorting and inspection station for forgings; *B*—Group elevator which carries the forgings to the top of the storage magazine; *C*—Magazine diverts bearings into different channels according to type and size; *D*—Flow control device which regulates the release of the blanks; *F*—The multi-channel main trunk conveyor; *G*—Tributary chute which feeds the machine; *H*—Automatic loading mechanism on the machine; *J*—Elevator which raises the blanks to the main trunk conveyor after leaving the machine; *K*—Inspection station at the end of the automatic production line. There are also several intermediate check points adjacent to the elevators

20-yr-old machines

STORAGE MAGAZINE AND FLOW CONTROL

The bearing-race forgings are fed by conveyor to an initial sorting and inspection station, Fig. 2, then raised by a group elevator to the top of a 15-channel storage magazine, Fig. 3. Blanks of 2.4 in. to 4.8 in. OD, and up to 1.4 in. wide can be handled simultaneously. They are distributed in the channels of the magazine, according to size. Jamming is avoided by periodic mechanical vibration of the unit. After rolling down the parallel zig-zag tracks they are stopped at the bottom by a gate mechanism, Fig. 4, which spaces them at controlled intervals along the trunk conveyor that follows.

The gate consists of fifteen pairs of vertical spring-loaded plungers placed across the path of the magazine exit chute. Vertical movement of each pair of plungers is controlled by an eccentric device driven by a pinion which engages twin lifting gears. Each of these driven gears carries an eccentrically mounted pin, which moves within a spring-loaded rectangular cross-head. The latter carries a plunger that controls the flow of the blanks. One plunger is ahead of the other in the line of flow of the conveyor. The

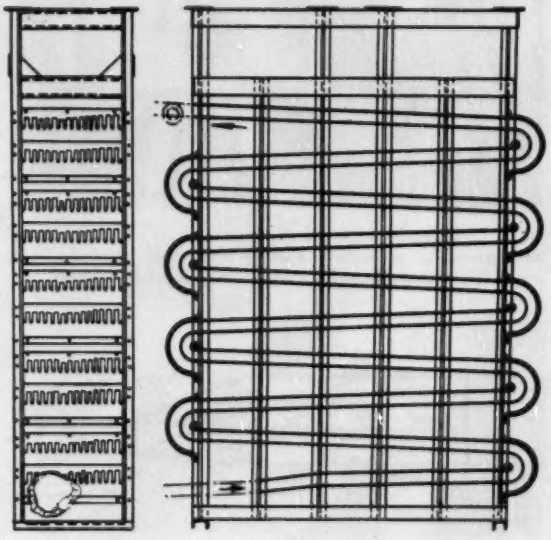


FIG. 3 . . . Storage magazine for the bearing-race blanks leads to the flow control device through which the blanks are fed to the main trunk conveyor

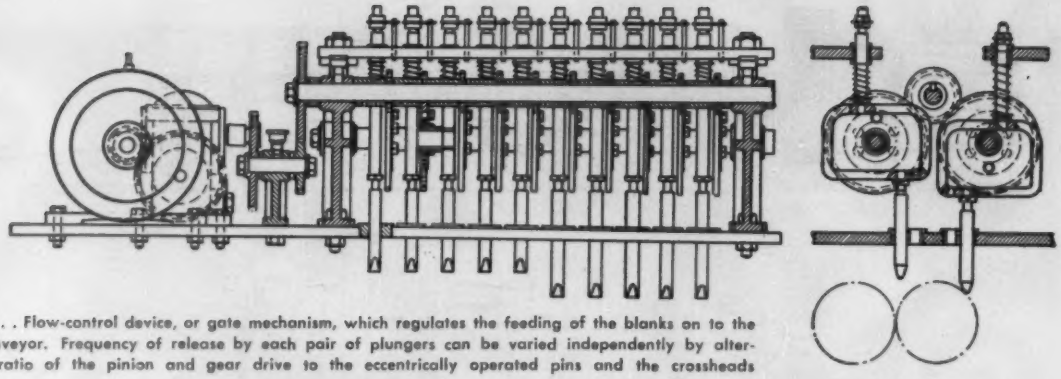


FIG.. 4 . . . Flow-control device, or gate mechanism, which regulates the feeding of the blanks on to the trunk conveyor. Frequency of release by each pair of plungers can be varied independently by altering the ratio of the pinion and gear drive to the eccentrically operated pins and the crossheads

Russians apply automation to 20-yr-old machines . . . continued

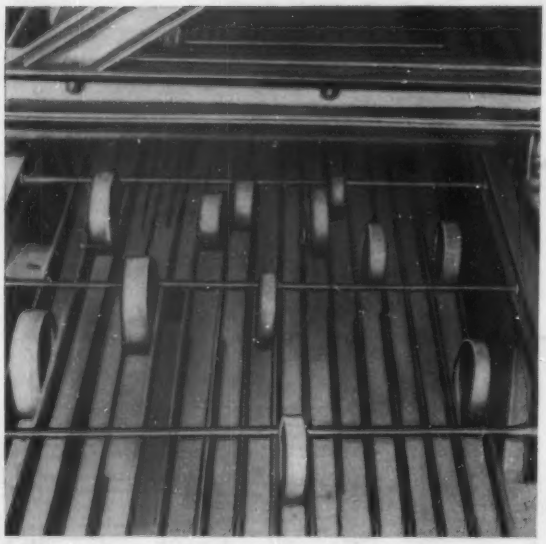


FIG. 5 . . . Multiple channels of the trunk conveyor are shown. Crossbars, carried by an endless chain on either side, draw the races along the 15 channels to the chutes which feed the machines

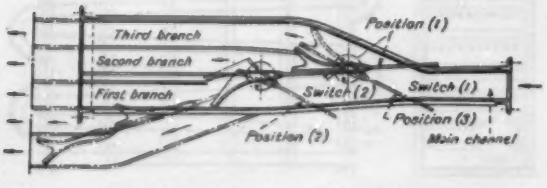


FIG. 6 . . . Distribution device automatically directs races of one kind and size, in correct sequence, to the different machines, as they enter the chutes from one channel in the trunk conveyor

eccentric pins which raise and lower the plungers are out of phase by 180°. Thus, as the first plunger is raised to release the blank the second falls, and restrains the next blank.

The driving pinions are carried on a common shaft, driven by an electric motor through a reduction gear. By appropriate choice of pinion-to-gear ratio for each pair of plungers, the rate of flow of the different sizes of blanks can be varied, in accordance with the cycle times for the different sizes and types.

CONVEYOR AND SWITCHING DEVICE

When released by the gate the blanks enter the vertical loading end of the multi-channel conveyor and are raised to a height of 10 ft. The trunk conveyor, Fig. 5, is suspended at this level above the floor of the shop throughout its total length of 250 ft. Blanks are rolled forward in their respective channels by the chain-driven crossbars spaced at 1-ft intervals. There is a channel of appropriate width for each type and size of race, and three of the channels are held in reserve. The channels are adjustable.

Feed from the overhead trunk conveyor to the appropriate machines is through hatches in the channels, opening into gravity chutes. When two or more chuckers are to receive the same type of race from a single track, a simple switching mechanization, Fig. 6, is placed just after the hatch in the line of flow. The device automatically distributes the blanks in fixed rotation among the several machines working in parallel. The flow is separated into two, three or more branches by interlocking pivoted gates, operated in sequence by the weight of the races. Ten of these switching units are used. Flow to the individual machines can also be governed by an electro-magnetic device from a signal initiated by the cam drum operating the machine cycle.

With the two switch gates in the position indicated by the full lines in the illustration, a race from the main channel will roll through and strike the head of the second switch (2), diverting it into position 2, shown dotted, and passing on into the third branch channel. The next race to enter the switching mechanism will be diverted into the second branch by the tail of the second switch (2), so displacing the first switch (1) into position 3 and returning switch 2 into its initial position. Consequently, as the third

race runs in from the main channel it will be diverted by the tail of the first switch (1) into the third branch to feed a third machine. In the process it restores switch (1) to its original position. Other branches can be served in sequence in the same way, the races automatically displacing the switches in the required sequence.

AUTOMATIC LOADING MECHANISM

From the gravity chutes the races roll down into the hopper of the automatic loader on each machine. This attachment, Fig. 7, is linked to an arm operated from a cam drum, which was fitted at the time the machines were rebuilt. Attached to the ram is the pneumatic collet for gripping the race when transferring it from the magazine to the chuck on the work spindle. The transfer collet is controlled by an air valve, timed by dogs on the cam drum. Starting and stopping of the spindle at the loading station is similarly synchronized.

A pneumatic interlock valve is provided on the attachment, operated by a trip on the ram which stops the machine in the event of a jam in the hopper, incorrect loading of the race in either chuck, inaccuracy in the size of the race, or obstruction by chips. A warning light indicates the need for attention.

Three different types of automatics are in use and all are equipped with the same type of loading device, but with different drives and mountings.

As each race completes the machining cycle it is extracted by the pneumatic collet. The ram carries it back to the unloading chute, ejects it, and then moves behind the loading hopper where the collet grips another blank.

For subsequent machining the race drops from the chute into a vertical two-channel elevator, where there is an inspection station. Channel No. 1 carries the race, via a feeder chute, to the automatic loader of the next chucking automatic for the second operation. Channel No. 2 returns the races from this second machine up to the overhead trunk conveyor. Each vertical elevator serves two machines, and there are twenty in all. A third elevator channel is provided, when three machining sequences are required. Automatic counters record the number of races passed to each machine tool.

After completion of the last operation, races remain on the multi-channel conveyor which carries them to the end of the line, lowers them to floor level, and delivers them to the final inspection station.

WHAT BENEFITS?

It is claimed that this setup for bearing races has increased machine utilization by 25% and brought a corresponding rise in output. The reduction in the number of operators required has cut man-hours for a given output by 27%. Although wages were increased, it is stated that production costs were reduced by nearly 10%.

Besides increasing productivity of individual machines, the group-type transfer line is credited with minimizing interruption of output caused by conveyor stoppages or machine breakdown. This results from the storage capacity of the distribution channels and the parallel operation of machines fed from these magazines. Economy of the installation is also mentioned, since existing chucking automatics can be adapted and linked together at relatively little expense.

This system is regarded as particularly suitable for bearing plants, because these are already equipped with large numbers of multi-spindle machines which lend themselves to conversion. The inclusion of cen-

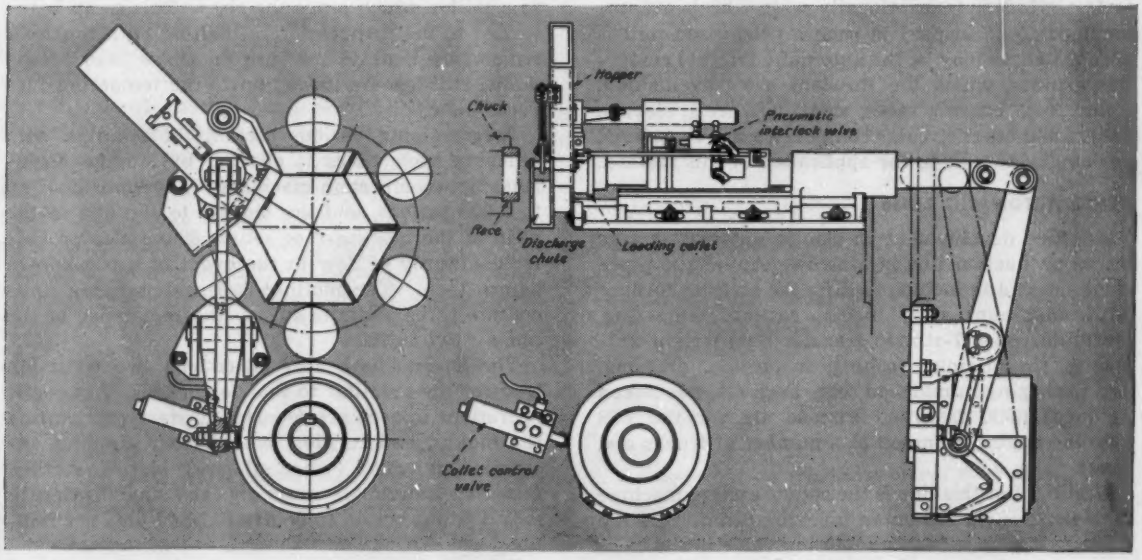
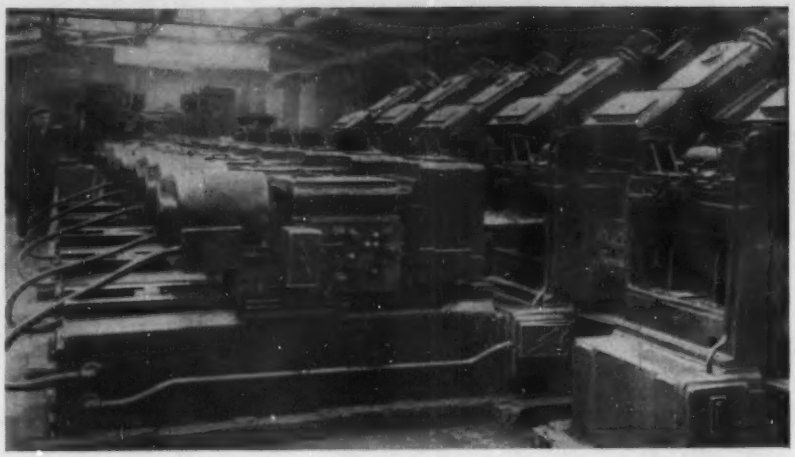


FIG. 7 . . . Loading attachment on the multi-spindle automatics is operated from the cam drum. The ram carries a pneumatically operated collet in which the blank is transferred from the hopper to the chuck in loading, and picks it up after machining to drop in into the discharge chute. The races are fed to the loading device through chutes leading from the trunk conveyor



More automation in Russian plants

Minsk Tractor plant makes use of a series of automatic transfer machines, providing a high degree of automation. Heavily built transfer unit shown is in operation on the large cylinder-head castings. A further transfer unit may be seen in the background. Little is known about the reliability of these machines, but they have undoubtedly been in use for some years now, in different factories

Armature shafts automatically, too

Transfer machine turns armature shafts in a fully automatic sequence. Shafts which have been faced and centered at a previous station are automatically handled for first turning operation at the station watched by the setter. Similar machine units further down the line complete the turning operations on the shaft and possibly grinding, since the Russians are understood to have developed an automatic centerless grinder. Reciprocating transfer bar is used

terless grinders (exceptionally wide wheels are understood to be in use) in such a production unit is anticipated, as may be the automatic internal centerless grinder, which the Russians are now making. Apart from bearing races, small flywheels, sleeves, collars and other circular components are considered as being adaptable to the application of this method.

OTHER AUTOMATIC LINES

Another development in Soviet automation is a piston production line in Moscow. Automatic processes are said to include feeding the melting furnace with aluminum alloy ingots, casting, tempering, machining on a 7-station transfer line, weight-balancing, tin plating, washing, inspection, greasing, and packaging in matched sets. Each stage is linked by mechanical transfer. Pistons are for the ZIS gasoline engine, common to a number of trucks and buses.

Highlight of this line is the rotary casting machine with six dies carried on an indexing drum. Dies are filled in sequence from a metering valve in the electric melting furnace. At the fifth station of the drum, when sufficiently cooled, the split die is opened and its casting extracted. The hot piston is transferred to a miller which crops the riser. This scrap is returned to the furnace for re-melting on a conveyor which runs beneath the entire machine line. Meanwhile, castings are moved on to the tempering furnace.

Programming various sections of the line with differing cycle times is effected by storage magazines between certain machines. Magazines hold up to 2,000 pistons, and are similar to the one at the head of the bearing-race setup. These also provide for continuity of flow in the event of a breakdown before them. The melting-casting-tempering units operate three shifts to supply the remainder of the line for two shifts.

The Soviets have also introduced two wrist-pin transfer lines similar to that for pistons. Automatic operations in each are reported to start with cutting the blanks, and turning, chamfering, grinding, inspection, rejection (when off-size), plating, sorting, marking, individual wrapping, and final boxing in sets. Output is said to be five finished pins per minute.

Other known applications of automatic machine lines in Russia include cylinder blocks and heads, piston rings, and armature shafts for electric motors.

Round Table

Pass-along praise

"Ed, what does the grapevine say Jones is sore about? He's given me the cold shoulder a couple of times today, and I can't figure out why."

"It was that die job, Al. He thinks you took credit for his work. I guess he overheard Harrison complimenting you on the job, and he thinks he should have gotten the pat on the back."

"For what, Ed, following out my orders? He was stuck on it, and came to me for help. I gave him an idea, and he went on and finished the job. Where's his gripe?"

"Well, he thinks he did some fancy brainwork, too, it seems. His beef is that while you took the credit from Harrison, you only had given him a germ of an idea. He actually worked it out and made it practical, Al."

"Why, that's silly, Ed. If I hadn't given him the germ, he never would have thought of how to make that setup. He's a good man, but he has an inflated idea of his own importance."

"Maybe you should have passed along some of Harrison's compliments, Al. It might have saved you some ill feeling."

"Nuts, Ed. Here I am telling him how to do his job, and he gets mad because the boss compliments me on it. Does he think I should have told Harrison it was all his idea?"

"No, I don't think he'd go that far, Al, but he sure wants a pat on the back. Maybe you could spare a little praise once in a while, even if you don't think the guy really deserves it."

"If I don't think he really deserves it, Ed, I'd never dream of giving a guy a buildup. He's only doing his job; and actually, in this case, he couldn't do it himself without some advice. Should I make a hero out of him after I've solved his little problem for him?"

"I don't know who really worked out the die setup, Al, but I do know you're being a bit harsh on Jones. Why not give him the benefit of the doubt?"

"Well, as far as I'm concerned, there isn't any doubt, Ed. Besides, the time is past, if he's mad about it."

"You're right there, but you might keep it in mind for next time."

SHOULD A FOREMAN detail the credit for all work to the supervisor, or should he accept it for the department, then parcel out the compliments himself? What if Jones is partly right in claiming credit for working out the idea? Your opinions on this problem can be a help to others. Discussions of earlier topics appear on later pages.

Half boiler shell on Hyster truck fork . . .

. . . carries small scrap parts from railroad siding to scrap yard. Company rebuilds and repairs freight cars, so truck is useful for getting unwanted sections of old cars out of the way. *Chicago Freight Car Co., Pueblo, Colo*

SHOP SHOTS

with Lift Trucks

Freight elevator only 120 in. deep . . .

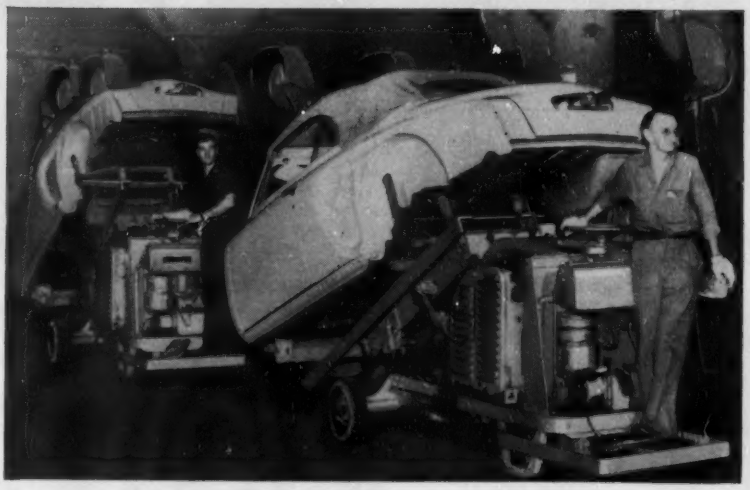
. . . was reason for hinged truck, which had to be full working length for use in shop. Platform and operator's pedals were all hinged to cut total length from 137 to 118 in., letting it slip easily onto elevator, but leaving 72-in. platform and controls free for working on the floor. *Elwell-Parker Electric Co, Cleveland 3.*

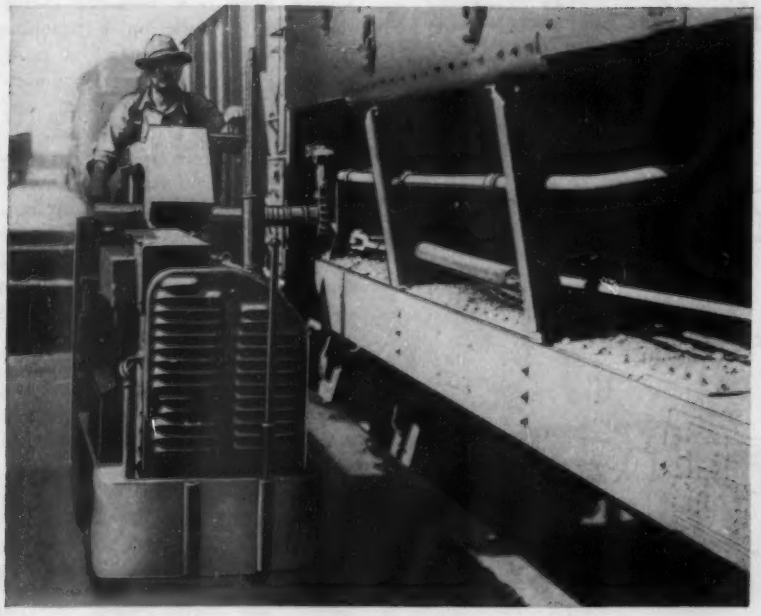
Machine tools go out of the shop . . .

. . . down the street, and into storage. Hyster Karry Krane moves them easily when new production plans call for different lineup of machines on production floor. For next run, machine may be brought back and relocated, but meanwhile it is out of the way, allowing good machine lineup for work in progress. *Premier Gear & Machine Wks, Portland, Ore*

Auto bodies move on special trucks . . .

. . . from initial-assembly areas to widely scattered storage points; later are moved to final-assembly area on same trucks. Trucks have three wheels, special racks, and can upend and store bodies vertically, which saves warehouse space at rate of 66%. *Elwell-Parker.*

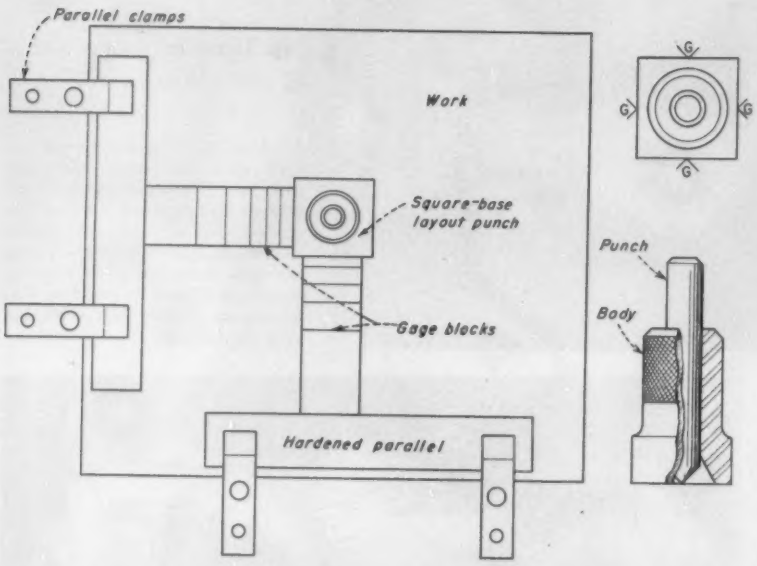




Power-takeoff wrench on truck platform . . .

. . . cranks bottom dump gates on iron-ore rail cars at Great Lakes port. Job used to take four men considerable time, effort, and exposed them to some danger. Truck handles labor in seconds; only one man required. *Elwell-Parker.*

Practical Ideas . . .



Guided Punch Speeds Layout

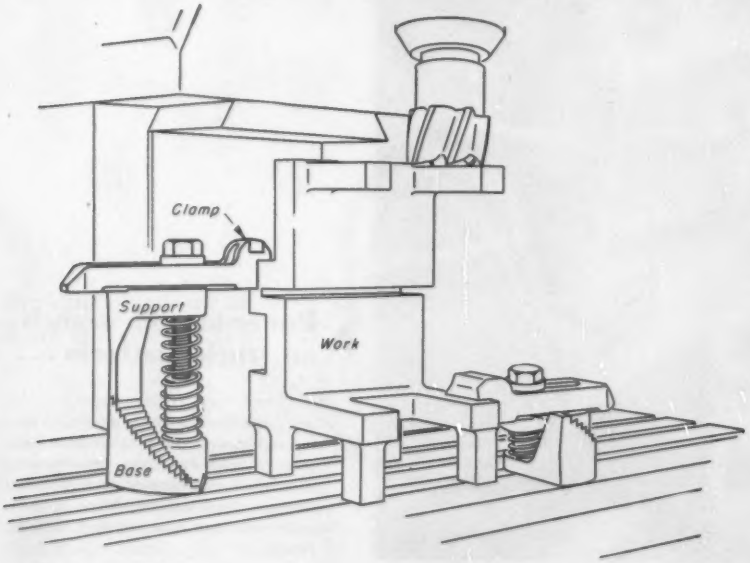
When it is needed to punch out a large number of accurately spaced holes, this device will prove very handy. The punch is located from two squared base lines on which precision parallels have been clamped. Spacing of each hole from these base lines to the sides of the squared base of the punch can be done most accurately with gage blocks, but inside micrometers will also work, if tolerances are not too close.

Gage blocks have the advantage that they tend to remain at right angles to the hardened base parallels. Therefore less care is needed to keep measurements square with them than with the inside micrometers. Care should be taken, though, not to damage the blocks when making the punch mark.

The support for the punch is a square-sided block, of some standard size, such as 1.000 in. The hole for the punch should be centered very accurately within the squared base. The point of the punch must, of course, be exactly concentric with the punch base, and both support and punch are hardened.

The hole in the support is lapped to a snug sliding fit with the ground punch, and the sides and bottom of the punch base are carefully ground. *H J Gerber, Stillwater, Okla*

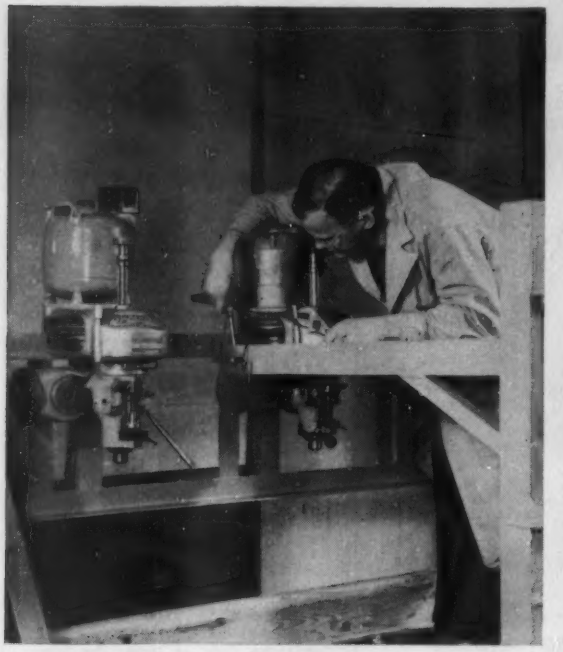
Sawtooth Steps Make Versatile Clamp



Shown here is a versatile clamp for holding work on a machine table. The clamp consists of base, clamping bar, sawtoothed bar support, washer, bolt, spring, and threaded sleeve with T-head.

The clamps can be made in several sizes, to accommodate heights from 0 to 12 in. Each clamp is a complete, compact unit, with no loose parts to be lost. Setup is quick and easy. No parts of the clamp protrude above the work. Clamping is done close to the workpiece.

As can be seen in the illustration, the clamp is very simple to use. The sawtoothed upper support is rotated until the clamp is the right height for the work, and the sawtoothed sections are engaged. A few turns on the spring-loaded bolt tighten the clamp and the work is ready. *A E Fristedt, Stockholm, Sweden*



"PARKING" RACK for vertical milling-head attachments is made by mounting dummy overarm supports on a welded steel rack. Heads are kept cleaner, and free from accidental damage

MANUAL HOIST eliminates risk to operators and equipment, and saves handling

Hoist and Rack Handle Milling Heads

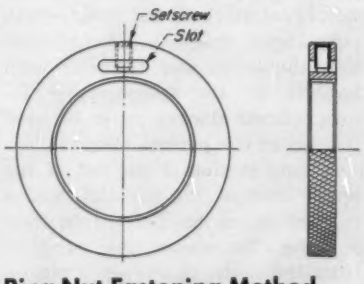
Vertical milling attachments are frequently mounted on and removed from conventional horizontal milling machines in the Central Shops at Argonne National Laboratory, where job-lots are small and changes in setup occur often.

To eliminate risk of accidents and damage to the milling heads, when interchanging the heads on the machines, two simple handling devices have been developed.

A standard manually operated shop hoist was modified to support the heads while moving them about the shop, and while positioning them on the milling machines or on the storage rack. Also, a "parking" rack, made of dummy overarm bars mounted on an angle-iron frame, was constructed so the heads could be stored safely off the floor.

Two channel-iron fork arms were welded to the hoist, to support a milling-head attachment while it is extended over the table of a milling machine. These arms are slotted for a flat crossbar that can be anchored in place with drop pins.

In operation, the hoist is positioned with its fork arms spanning the milling head. The crossbar is placed under the belt housing of the head and into the slots in the fork arms. The crossbar is pinned to the arms, and the belt housing is clamped to the bar. By raising the hoist, the weight of the head is removed from the overarms, either on the milling machine or on the rack, and the head can then be moved safely. *Oscar Wittlinger, general foreman, Central Shops, Argonne National Laboratory*

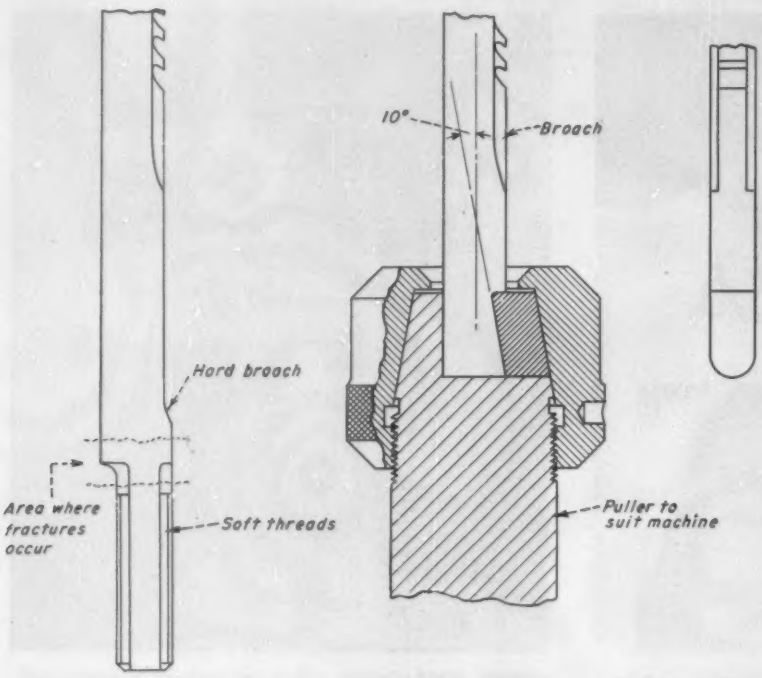


Ring Nut Fastening Method

To secure a knurled ring nut to a threaded shaft, without damaging the threads, try this method. Mill a slot through the body of the nut, as shown. Then drill and tap a radial hole to receive a hex-head setscrew.

When the ring nut is placed on the shaft, the setscrew can be tightenend, causing the thin inner wall of the nut to yield, and grip the thread without damage.

If necessary, several slots can be placed radially around the rim of the nut. *G R Milner, Gainsborough, England*

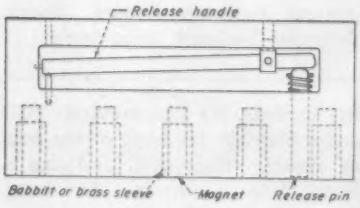


Simple Repair For Broach Puller

We had a number of broken broach pullers which we wanted to repair. We tried brazing the broken parts together, but they broke again just above the braze.

Instead of this, we then made the simple repair shown here. The modified puller can be done in a very short time, and, will repair a broken broach very quickly.

If desired, the puller can be made by means of inserts, to accommodate a range of sizes. *S George, Lancashire, England*



Magnetic Parallels For Safer Repairs

We do a lot of maintenance and repair work, and a lot of the jobs require setting work on parallels to drill holes. We have had a few accidents on this kind of work, when the parallels fall over.

To cut down the chance of this happening, we have designed and built the parallels shown here. The parallels are made of CRS, and deeply counterbored. High-strength permanent magnets are pressed into the holes and fastened with babbitt or low-temperature alloys. (Brass sleeves could be used instead of the poured alloys.)

A long section is cut out of the upper part of the parallel, and a release lever is built into this opening. To release the parallels from the table, this lever is picked up, wedging the parallel away from the surface it is resting on. *Henry George, Bronx, NY*

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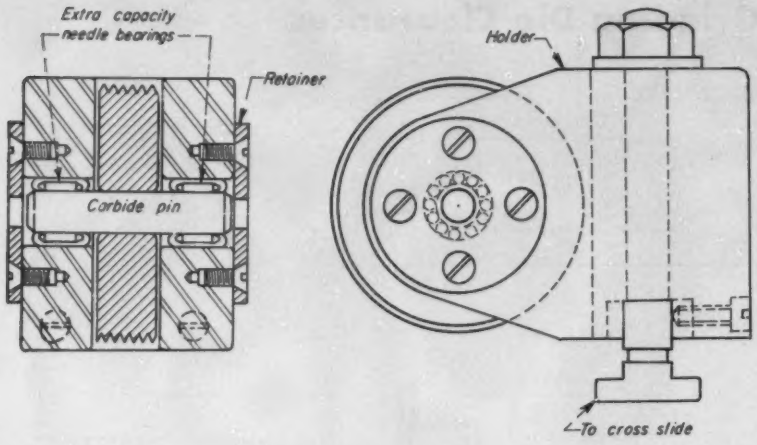


Anti-Friction Holder Aids Thread Rolling

Thread rolling on lathes and automatics is done efficiently with the anti-friction roll-holder shown here. Holders of this type are useful in single-roll threading of nonferrous metals, rolling fine pitch, threads of relatively short length.

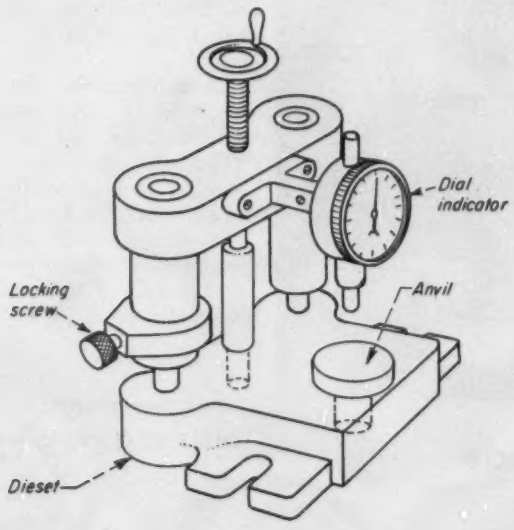
The outstanding design feature of this type of holder is the anti-friction bearing in which the load is spread out on needle bearings, instead of being concentrated in a single spot, as is conventional. This design gives better concentricity and roll life, because of freedom from pin-wear.

Bending of the unsupported work piece is not a problem when rolling large diameter stock, as long as the proper tooling sequence is observed. The thing to remember here is to keep wall thickness as large as possible until after rolling.

Rate of feed is about 0.003 to 0.004 in. per revolution, giving a steady, gradual penetration of the roll into the work.

If bending occurs in spite of these precautions, the usual roll supports or V-back rests can be applied from the turret or end slide of the lathe or automatic.

In one rather unique setup, single-roll threading was done on the OD of very thin tubing. The ID was bored and the OD was turned to pitch diameter. Then a special revolving roller support was brought from the end slide, to fit the ID of the bore quite closely, while rolling was completed. *Fred Buehler, East Rochester, N Y*



"Dieset Comparator" Easily Made From Stock Parts

The device shown here is a quickly and easily made comparator. The basic unit from which the comparator is made is a commercial dieset, available in a wide range of sizes, direct from suppliers' stock. A little work completes the tool.

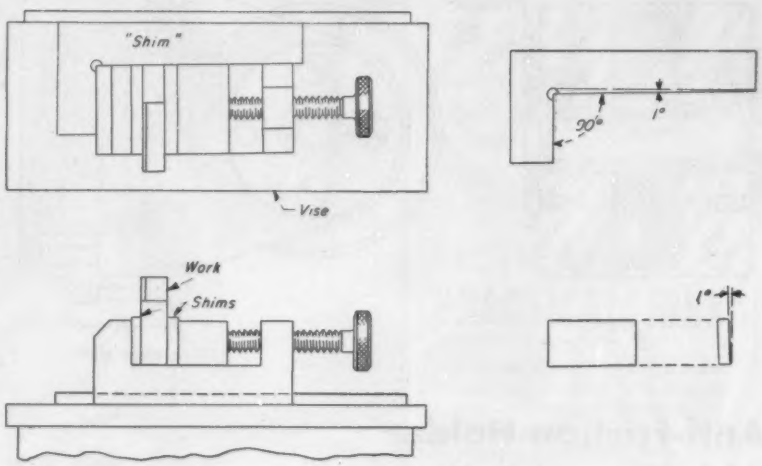
The top half of the dieset is machined away to take a bracket which holds the indicator gage. A hole is drilled and tapped centrally between the guide bushings, and the adjusting screw and handle are attached as shown. A clearance hole is drilled in one of the hardened guide bushings, and the locking screw block is pressed onto this bushing so the knurled brass locking screw lines up with the clearing hole on the bushing. In the bottom half of the dieset two holes are drilled. The anvil and stop pin are then pressed in. The stop pin should be dimpled and hardened at the top as it also acts as a bearing for the height adjustment screw. *Jerry Coates, Middlesex, England*

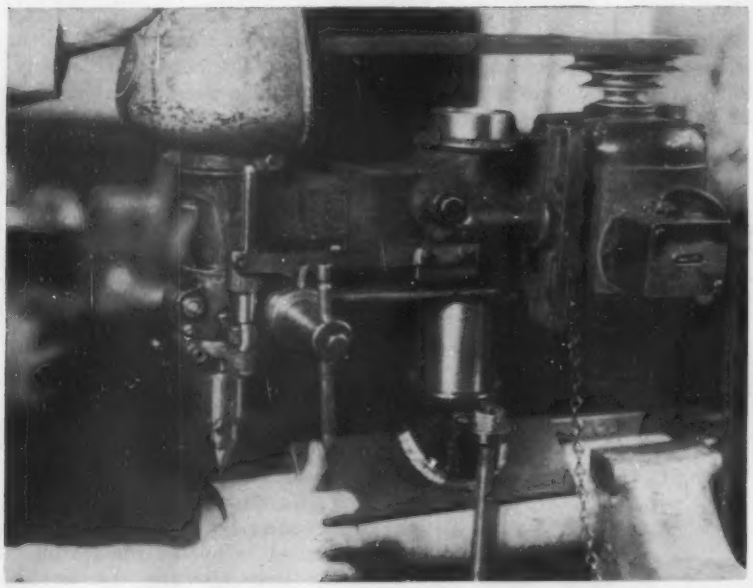
Tapered Shims Aid Grinding Die Clearances

The two blocks shown here give us a very useful and inexpensive method for grinding clearance in sectional die segments. To use the blocks, the segment is placed in the vise between the two tapered shims. The vise is then placed against the L-shaped block for grinding the clearance.

The angle between the sides of the "shims" is determined by the degree of relief wanted in the finished die segment.

Even though this is a very simple method, it works much better than the common practice of shimming up the vise or the die segment with paper or steel shimstock. *A Jonas, Glen Oaks, NY*





Serrated Depth-Stop Speeds Stainless Drilling

We recently had to drill some 4-in.-OD, ½-in.-wall, type 302 stainless tubing. In doing the work, we were having a lot of trouble with chip clogging and subsequent drill breakage, so we found we could only drill a few thousandths at a time.

To allow for this problem we made an alteration to our drill-press table which considerably speeded the work. We removed the depth-stop nut and replaced it with one which had 20 ratchet serrations on its OD. A spring dog was bolted to the side of the drillhead, and a feed bar, supported on a slide, was also attached to the head. The feed bar was driven back and forth by a brass friction collar clamped to the feed-handle shaft.

In this manner, we constantly retracted the feed stop-nut 0.003 in. per stroke, and, by rapidly oscillating the feed handle, we were able to drill as many as 6 or 8 holes before the drill became dull. This arrangement allowed us to drill over 500 holes with only one broken drill. *F H Sumption, Whaley Engineering Corp, Norfolk, Va*

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American Machinist REFERENCE BOOK SHEET

Simplified Static Balancing...I

JAMES W REID, mechanical engineer

Today the importance of balancing is well recognized, and high-speed production balancing machines have been brought to a high peak of efficiency. Even in the "job-lot" field, balancing procedures have been refined and standardized. The techniques outlined here were developed to increase production in this latter field. Considerable savings may be effected by adopting them in shops still using the time-honored cut-and-try method. In the heavy-equipment field, a careful consideration of these techniques will also lead to improved production.

BALANCING WITH ONE WEIGHT

To determine the amount of unbalance in an object by placing a known weight in only one position: Mount the unit to be statically balanced on balancing ways, or rollers, in the usual manner. Determine the position of the unbalance and scribe a line on the hub, or any available face, in line with the action line of this unbalance (*AB* in Fig *1*). Fasten the known

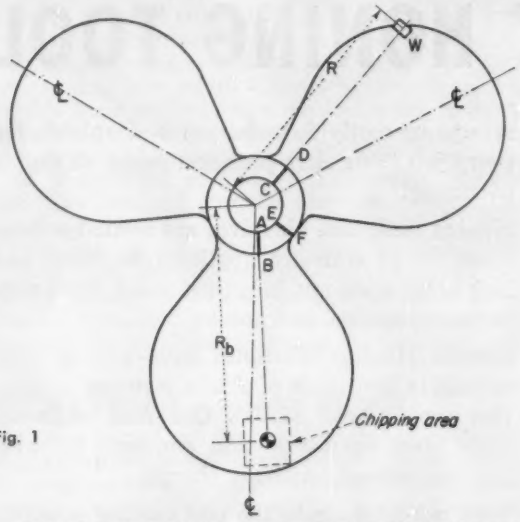


Fig. 1

weight *W* to the unit in a convenient spot at a known radius *R* somewhere between 70 and 150° away from the line of unbalance. Scribe another line on the hub parallel to the action line of this weight, *CD* as in Fig *1*. As this weight has altered the amount and position of the unbalance in the unit, the new action line of unbalance should be found, and another line *EF* scribed on the hub parallel to this. Measure the angles between these three lines. Then lay out lines corresponding to them, Fig *2*, where *OB* is parallel to *AB*, *OF* to *EF* and *OD* to *CD*.

Multiply the weight added *W* by its radius *R* to obtain the in.-lb of balance correction *WR** added. Select a suitable scale to represent the in.-lb of correction (say 1-in. equals 100 in.-lb) and layout a length (*OP*,

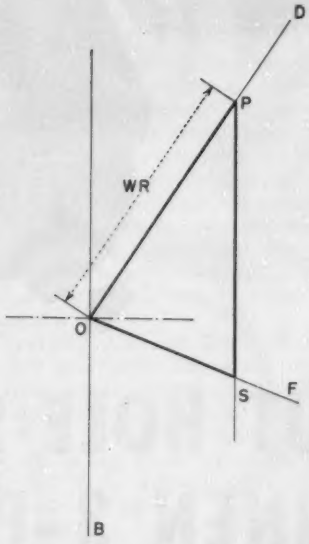


Fig. 2

Fig. 2), on the line representing the position of the weight added, equal to the in.-lb of correction. From point *P* draw a line parallel to *OB* until it intersects *OF* at point *S*. Measuring *PS* to the selected scale will give the amount of unbalance in the unit in its original condition, and its action line will be along the line *AB* which was scribed on the hub.

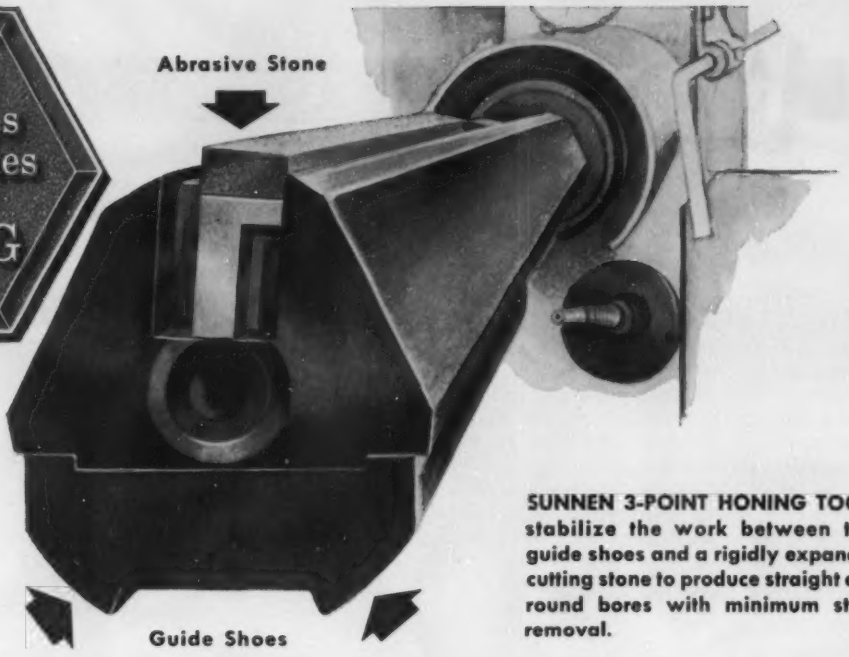
To determine the amount of weight to be added or subtracted, measure the distance from the center of gravity of the weight, to be added or subtracted, to the center of rotation of the unit. Call this distance R_b. Divide the in.-lb of unbalance *WR* by R_b, and the result will be the amount of corrective weight to be used. (If it is to be removed, it is taken from the heavy side; if to be added, to the light side around *AB*).

As usual, it is important that the friction angle of the ways, or rollers, be taken into account in determining the action lines of unbalance. This angle is due to the friction in the rollers or ways which sets up a force resisting the rotation. If reasonable care has been taken of the balancing apparatus this force should be small and constant throughout the motion or when static.

However, as the position of the heavy side changes, the force it exerts to cause rotation varies. This can be seen by referring to Fig. 3, in which the unbalance is represented by the weight *U*. When *U* is in its horizontal position, *X*, it has a maximum turning moment, but when vertical, *Y*, it does not exert any rotating force. Somewhere between *X* and *Y* the turning force of the unbalance will just equal that of friction. If

**In some shops unbalance is often referred to as "pounds of unbalance". This term probably originated from the practice of always adding (or subtracting) weight on the same radius. In this case, the weight is the only variable and the term is a relative indication of the unbalance. However, the use of weight alone to specify unbalance is misleading and its use should be discouraged.*

Today's Tolerances and Finishes Call for HONING



SUNNEN 3-POINT HONING TOOLS stabilize the work between two guide shoes and a rigidly expanded cutting stone to produce straight and round bores with minimum stock removal.

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Simplified Static Balancing...II

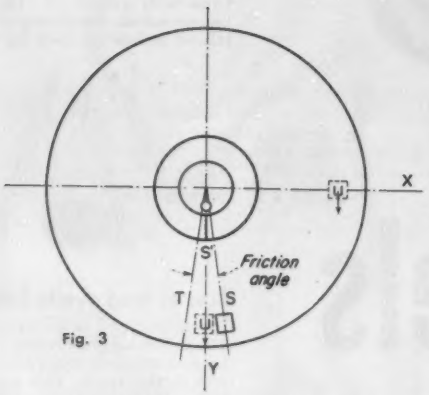


Fig. 3

rotation is stopped at this point (say *S*) the unit will not move unless external force is applied. There is a similar point on the opposite side *T*. The angle between these positions is the friction angle and if the unbalance is placed so that it falls within this angle the unit will not move when released.

To determine the true action line, let the unit first come to rest. Then rotate it slowly to one side until a point is found beyond which the unit, when released, starts back of its own accord. While in this position scribe a vertical line on the hub *OS'*. Repeat the operation on the other side. Bisecting the angle between these two lines will give the true action line of the unbalance.

The larger the amount of unbalance the greater will be the force to overcome friction and the friction angle will be smaller. Since small angles will allow more accurate determination of the true action lines no attempt should be made to balance the unit with the weight *W*.

SPLITTING CORRECTIVE BALANCE WEIGHTS

In many cases it is impossible to place the corrective weight exactly where required. In order to determine the corrective combination to effect balance, select two positions, one on either side of the exact location and as close to it as possible. These lines do not have to make equal angles with the true action line. Measure the angles between these three lines and lay them out on a sheet of paper as shown in Fig. 4. On the line representing the exact location, lay out the in.-lb of correction required to scale *AB*. From *B* and parallel to one of the area lines draw line *BC* until it intersects the remaining line at *D*. Then *AD* measured to scale will give the in.-lb to be used on its corresponding area and *BD* the amount on the other area.

PRELIMINARY STATIC BALANCING

In cases where the object to be balanced is of irregular shape, where the area for weight removal or addition is limited, where the object is very large or heavy, and where past experience has shown the amount of unbalance to be excessive, etc, a preliminary balance before final machining may be advisable. The unbalance found at this time may be compensated for by throwing the centers, machining certain sections eccentrically, etc. Various formulas exist to determine the amount of correction required. All of these are based on the fact that static unbalance, no matter what its cause, is due to the fact that the center of gravity and the center of rotation do not coincide. The corrections seek to bring them together either by shifting the center of rotation or by removing weight eccentrically so that the center of gravity is shifted back toward the center of rotation.

A case illustrating this point is the preliminary balancing of ship's propellers. Blades are being finished to closer tolerances than heretofore and as a result less material is available to effect final balance. This requires that balance chipping be held to a minimum. To assure this a preliminary balance is made as follows:

The bore is left ⅜ in. small and the propellers are mounted on a mandrel made to fit. Unbalance is then determined by the one weight method. An approximate balance is obtained by shifting the bore center into the heavy side by an amount equal to the distance obtained by dividing the in.-lb of unbalance by the weight of the propeller. For example, if the unbalance was found to be 1580 in.-lb and the weight of the propeller was 12,800 lb, a shift of 0.123 in. could be made (1580 ÷ 12800). As the wheel is finished by hand chipping, a shift of 70 to 80% of the amount called for is more practical. In this case a shift of 3/32 in. would probably be the amount used. The bore is then finish-machined about the new center. This technique cut the final static-balancing time required for the propellers in half and also eased the dynamic-balancing problem.

The reader has probably recognized the fact that in this article unbalance has been treated as a simple vector problem. Once it is realized that unbalance can be handled in this manner, additional savings can be made by analyzing special problems in the same way.

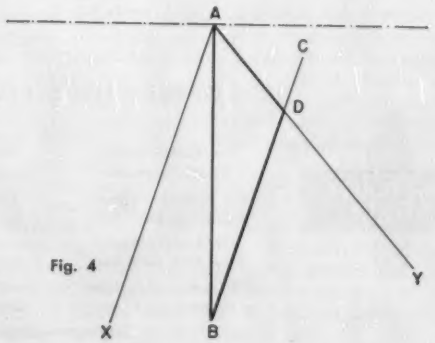


Fig. 4

Yes

Leaded Steels Can Be Forged

This is our answer based on experience with many producers of forgings who have used leaded steels. Ledloy* and leaded alloy steels can be heated and forged in exactly the same manner as comparable standard steels.

No modifications in forging practices have been necessary is the report from users of leaded steels.

Leaded alloy steels and leaded carbon steels for forging are available in all standard or S. A. E. compositions and in any of our standard sections. Write today for complete information about application of leaded steels to your forged product.

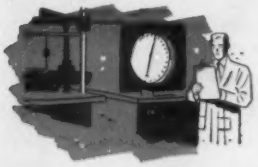
*Inland Ledloy License

Are leaded steel forgings readily machinable?

Yes, the use of leaded steel forgings will result in the same improved machinability as is obtained in leaded steel bars.

Loss of lead due to heating?

Investigation has shown that the exudation of lead upon heating leaded steels is confined primarily to the scale. The lead content in the forging proper remains virtually intact.



Does lead affect mechanical properties?

No, the addition of lead does not materially affect the mechanical properties of forging.

Is there a health hazard?

Not generally. With ventilation normally required in forge shops, the use of leaded steels does not present a hazard.

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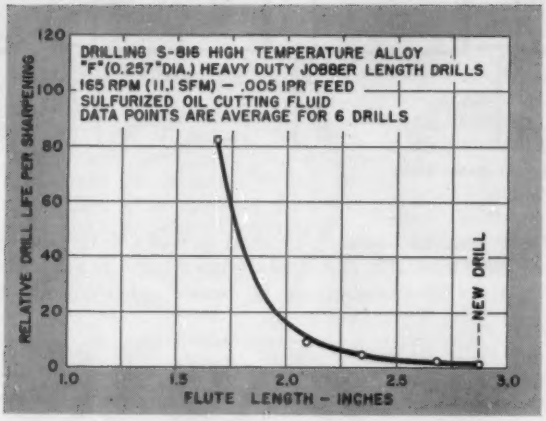
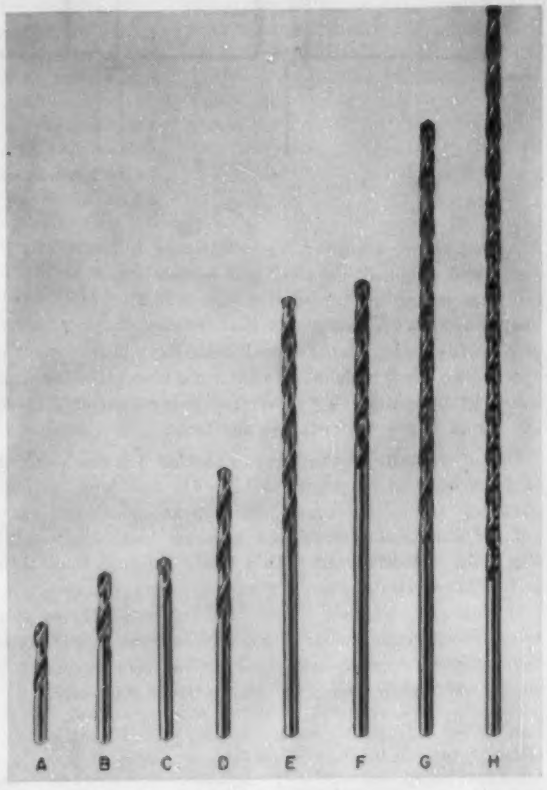
Drill Length

COURTESY NATIONAL TWIST DRILL & TOOL CO



DRILL LIFE. An increase in drill life with shorter drills is more striking when used on tough materials than on ordinary materials



DRILL LENGTHS. Drills in two length categories are shown:

Short Drills—

A—center drill, very short to avoid deflection

B—stub screw machine drill, rigid for good life and accurate hole location

C—special skin drill with short flutes to combat stresses when breaking through sheet metal

D—jobber's drill, medium short, for rigidity plus usefulness on general-purpose applications

Long Drills—

E—straight-shank, taper-length drill, with over-all length corresponding to same size taper-shank drill

F—aircraft extension drill for shallow holes in hard-to-reach places —6 to 12 in. long; same flute length as *D*

G—extra-length special drill for soft materials

H—modified-point, shallow flute drill for high-alloy steels and other hard materials

Twist drills for various lengths are designed to accommodate various depths of holes, clearances available, and reach required for various drilling operations. Drill manufacturers offer industry several series of stock drills, each series of a different length. The user should always determine the proper length of drill to use for given operations, because of the economics involved.

Short drills will produce more holes per sharpening than long ones, everything else being equal, because the shorter drill is more rigid. Therefore, it is less subject to chatter, bending and windup.

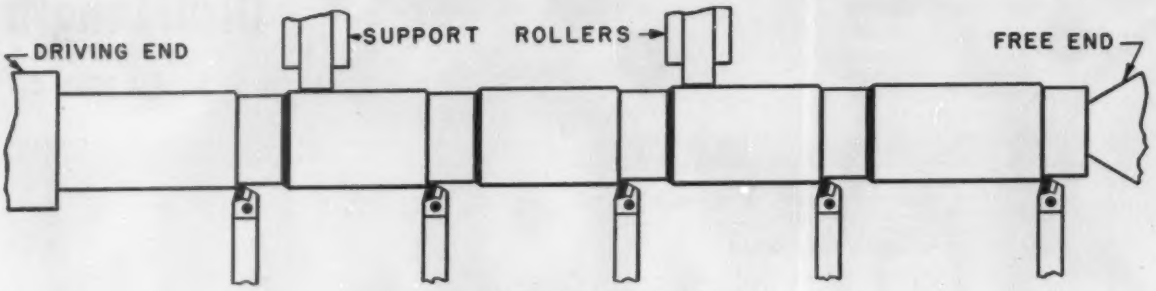
Optimum drill design is one with the best balance between chip space and rigidity. Sometimes, the drill point can be changed to break up chips into smaller pieces, which will pass out through narrower and shallower flutes. However, modifications in web and flutes to obtain greater cross-sectional areas, hence improved rigidity, are less fruitful than consideration of projected lengths and flute lengths, especially the latter.

Causes of Drill Breakage. Torsional deflection of drills, or wind-up, results in chatter, is destructive to cutting edges. Torsional deflection, intermittent in character, occurs throughout the entire projected length of the drill, but is most severe in the fluted portion, and here it is roughly proportional to the length. Thus, shortening the fluted length by 50% should approximately double the rigidity.

Rigidity of the entire setup, including the drill, is of greatest advantage, faster production and more pieces per sharpening will result. Therefore, where you can, use the shortest possible drills. You sacrifice in potential number of sharpenings, but you gain in number of holes per sharpening, and you may well be ahead in the long run in reduction of failures from chipping of cutting edges and drill breakage.

CUTTING COSTS

BY REDUCING TOOLING COSTS



4½' long tube used in example shown below.

A well known manufacturer employing Industrial Engineers and emphasizing time and motion study as one of the most important factors for cost reduction and control has been made forcibly aware that the contributing factors of machine and perishable tool costs have been too often overlooked. Now he is doing something about it. He set up a task group whose job it is to effect cost reduction through the use of improved machines and tools.

One of the first jobs this group tackled was the lowering of costs of tools machining a tube 4½ feet long, without changing any of the conditions such as speeds and feeds but by simply replacing the existing toolholders using 1½" long carbide inserts with a newly designed Toolholder and "Throw-Away" Blanks that require no grinding. This manufacturer, by this simple change, was able *to save more than* $144.45 *per* 1000 *pieces machined.* All this was accomplished without any speedup in workers' pace. It was accomplished simply *by a lowering of tool costs.*

Example

By using old Toolholder		By using newly designed Toolholder	
Cost of each carbide ⅜" I.C. Triangular (6 cutting edges) insert 1½" long	$ 4.00	Cost of each carbide ⅜" I.C. triangular (6 cutting edges) "Throw - Away" blank	$ 1.01
Cost of 10 regrinds at $2.00 each furnishing 60 cutting edges	20.00	No regrinding required with "Throw-Away" blank	0
		Cost of 10 additional "Throw - Away" blanks furnishing 60 cutting edges	10.10
Total cost of carbide and grinding	24.00	Total cost of carbide (no grinding)	11.11
Number of stations	5	Number of stations	5
Total Cost	$120.00	Total cost	$55.55
Number of components	600	Number of components (note number of pieces has been increased from 600 to 1000)	1000
Cost per component	.20	Cost per component	.05555
Cost per thousand pieces	$200.00	Cost per thousand pieces	$55.55

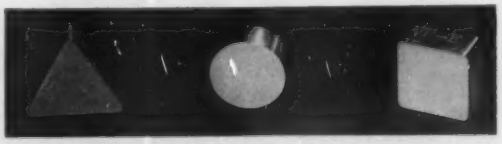
Savings—$144.45 per 1000 pieces

The cost of the five newly designed toolholders involved is 125.00. Here is an instance of where an accessory almost paid for itself in the first five days of its use.

If this had come by accident it would have been considered a miracle. It did not; it was planned as a deliberate goal by the manufacturers of carbide and cutting tools.

All five Toolholders are Vascoloy-Ramet Style TBTR using ⅜" Inscribed Circle V-R Grade E. "Throw-Away" Blanks.

They were aware that something had to be done to effectively reduce tool costs and after four years of development, trial and investment in precision equipment they have launched what appears to be the greatest saving in machining, both in actual costs and time consumed in machining, since the introduction of carbide itself as



Triangular, Round and Square precision "Throw-Away" blanks for the new Toolholders. Precision "Throw-Away" Blanks are ground all over and are used where precision indexing is desired. Utility "Throw-Away" Blanks, ground on two faces only, are also available in Triangular and Square blanks.

a cutting tool. If you wish the name of the firm whose case history is outlined above and more details about the cutting tool and "Throw-Away" Blanks write today—

VASCOLOY-RAMET CORPORATION
814 Market Street, Waukegan, Ill.

Talking Shop . . .

Make Your Own

A RECENT EDITORIAL REPRINT of a speech by W W Sebald, president, Armco Steel Corp, carries a startling back-cover ad. Headed "Make Your Own Money," it includes the usual thriller-diller pulp-ad techniques—testimonials with pix of the testifier, much use of words like "free," "we train you free," "use our amazing machines," etc. The avid reader discovers that it is a want ad for men to work at Armco. Such benefits as paid vacations, insurance, safety, and the like are all offered in scarehead type. Sample: "Be Independent! Produce, real, spendable money on our special machines. Buy television sets, automobiles, fine clothes, with the money you can make on these marvelous machines. NO WAITING. NO RED TAPE. You start making money the first hour you begin to use these machines. . . ."

Russian Millers

SOVIET RUSSIA is using long-table millers instead of planers, according to a recent report. Out of 100 machine tools built, 12 will be milling types, 2 planing units. This results from disparities in possible surface speed. Planers there reach 80 meters per min (262.48 fpm) for steel pieces under 50 metric tons, 50 m/m (164 fpm) for larger ones. (The report says "per second"—fascinating speeds, if the table could be stopped, of 15,750, and 9,840 fpm!) Millers, on the other hand, achieve 800 m/m (2,625 fpm), and productivity is about four times as great. Electrical consumption is lowered too, an important factor there.

Biggest Soviet millers run 18.5 m (60.7 ft) long, 8 m (26.25 ft) wide, and as high as "a 2-story apartment house." The table is 8x28 ft, can move 29½ ft. "Portal-type" machines (double-column) handle up to 4 vertical heads (angle to 30° each side) cutters, each with a 25-kw motor. These have 12 speed ranges of 23.5 to 300 rpm, table feeds of 0.91625 to 46 ipm. Tool feeds are 0.14625 to 7.8 ipm. Machines are hydraulically and electrically actuated, and controlled from a pendant station.

Ti Friction-Sawed

RYAN AERONAUTICAL CO, San Diego, has researched further the friction-sawing of high-alloy steel with "home-made" blades and has gotten satisfactory results with lower surface speeds than those reported by Solar Aircraft two years ago (*AM*—July 7 '52). Solar used discarded mild-steel box strapping, found that special know-how and blade guiding were necessary. When Ryan tested Solar's methods, speeds of 18,000 sfpm seemed necessary, which added to machine wear and reduced safety. Also, excessive pressure on the part was required. Working on stainless and other high alloys, Ryan found speeds around 4500 sfpm best. Actually range rises with nickel content of the alloy from 2100 sfpm up. Box strapping works well on some jobs, but heavier-gage metals are cut better with spring-steel toothless blades. Also, box strapping (mild steel) tends to loosen on larger saws.

Ryan has sawed titanium successfully, even though experts have said friction sawing of Ti is impossible because of drag, hardness, and tendency to form the oxide. Cuts of 20 lineal in. on a 6x6x8-in. billet were made in 2 hr. A T-shaped part was sawed out, replacing milling, and leaving two cut-away pieces worth $320 instead of a pile of scrap chips. First attempts, with tooth blades, resulted in a cut ½ in. deep after 16 hr and 20 blades. With 3 toothless blades, a 20-in. cut was made in 2 hr. Blades were home-made, of spring steel; speed was 4500 sfpm on a large 5-hp Tannewitz saw. Cost, including steel and butt-welding, is 80 cents a blade, compared with $2.50 to $3 for purchased toothed blades. Ryan feels that both types have their uses, but toothless ones are cheaper. Toothed blades cut around a radius better because the set provides turning clearance, and on stainless gages above 0.049 in. Below that, the toothless blades work well and create less burr. Pressure is about the same, but special blade guides are required, as in Solar's experiments earlier.

Sapolio

IN THE EARLY DAYS of the Indianapolis auto race, three mechanics, in widely separated towns, developed great word-of-mouth reputations for their ability to "run in" a racing-car engine. One of our editors at the time did some careful sleuthing, found each was using a "secret formula" to run in piston rings. In each case, the secret turned out to be Sapolio, then a common kitchen cleanser and polish, a mild abrasive that somehow has since vanished into limbo. A little Sapolio in the engine did a lot towards smoothing out performance.

Oldest Coolant

WATER long has been considered the best coolant for most grinding operations—but it has the disadvantage that unless treated with an anti-rust additive, it causes rapid corrosion of both machines and work. Oldtimers in Metalworking will remember that one of the first successful additives was sal soda (known to the chemist as *sodium carbonate*—Na_2CO_3). It was abandoned years ago in most shops when soluble-oil bases were introduced for making water-base cutting fluids. However, we recently found sal-soda solution in each grinder in one large shop. The general foreman—who has been finishing big precision steel parts for more than 30 years, says he has tried every available base for making grinding coolants, but that none matches sal soda in terms of fine surface finishes, reduced wheel loading and wear, and low over-all costs. And it is widely used for steel-mill roll grinding. Mixture generally used is approx 6 lb of sal soda to 100 gal of water.

News of Metalworking...

MILAN FAIR 1954: Biggest

Pretty much to everyone's surprise, the Fourth Annual European Machine Tool Exhibition turned out to be bigger and better than its predecessors. One reason: European builders offset flagging sales by unveiling new developments that otherwise would have been held off the machine-tool market for some time

and Best of the Internationals

MILAN, ITALY—Better than Brussels in 1953, better than Hanover in 1952, and better than Paris in 1951—that was the consensus of metalworking men from all over the world who attended the Fourth European Machine Tool Exhibition at the Palazzo Europa here September 14 through 23.

While the Milan Fair didn't break any attendance records, its success was attributable to a number of factors. For one thing, those who attended were buyers, not sightseers. For another, Milan's 865 exhibits displayed 3500 machine tools, exceeding those of any previous Exhibition. Facilities were excellent, with the Fair occupying nine spacious buildings at the Milan Fair Grounds, eight of them devoted to displaying machines.

Wide aisles, lofty roofs, plenty of power to drive the tools, and traveling cranes to move even the biggest of them — all set off the machine tool displays to their best advantage. There was no sense of crowding at any time.

Many New Machines

While no revolutionary designs were shown at Milan, there were enough brand-new machines and improvements displayed to interest regular European Show visitors. One explanation for this is that with machine tool sales declining, many European builders unveiled new developments at Milan that might otherwise been held off the market for some time.

A fair proportion of machines shown for the first time were new models of machines exhibited at previous shows, or were of sizes designed to fill gaps in the makers' machine tool lines.

Germany predominated at the Fair, in number of exhibitors and in the amount of space used. Her 304 builders occupied 162,830 sq ft, or 40% of the total Fair exhibit space of 435,000 sq ft. Even at that, the Germans, for sheer numbers and size, fell short of their performance at previous shows.

The Italians, displaying their wares on home grounds, took up some 20% of the total area with 245 exhibits. The United States, with 31 firms represented, took only 2% of the space. Other nations in number of exhibits were: France 78, Switzerland 74, Belgium 25, Great Britain 44, Sweden 21, Austria 13, Holland 12; with Spain, the Saar and Leichtenstein having one exhibit each. Altogether 13 countries were represented.

The 31 US companies, with space totaling 23,940 sq ft, occupied a larger area than Great Britain's 44 exhibits, and took almost as much space as Switzerland's 74. Several American builders showed their machines for the first time anywhere. And a number of US machines on display at Milan were built by European licensees.

Plenty of Competition

Keenest competition was evidenced by the fact that there were 103 exhibitors of lathes, 81 of milling machines, 65 of grinders, 31 of presses and hammers, 29 of drilling and tapping machines, 27 of boring machines, 26 of gear-cutting machines, and 26 of sawing and cut-off machines.

One trend evident in Europe is the conversion of semi-automatic machines to fully automatic operation. A number of machines displayed had been modified in design to facilitate magazine feeding. This trend is particularly noticeable in gear-cutting machines.

Preselector devices of one kind or another were on all kinds of machines at Milan, including radial drills and screw machines. Most of them are to facilitate speed-and-feed changes. Rapid spread of these devices can be chalked up to the development of electro-magnetic clutch units. A Belgian lathe shown at Milan has a de-clutching pedal. Gear changes are made in the same way as in an automobile.

Small-scale automation, that is, the conversion of semi-automatic machines to full-automatic operation by fitting automatic feed and ejection devices, is definitely the coming thing in Europe. A number of machines were shown with the design modified to facilitate magazine feeding; a trend that, for some reason, is particularly marked in gear cutters. This feature was noted on an American gear shaper and on two German gear cutters. Two British machines featuring automatic feeding were a thread roller and a five-spindle automatic. A Swiss copying lathe automatically loads and removes between-center work, and a German single-spindle automatic is equipped with auxiliary indexing workholders and toolheads to become, in effect, a miniature transfer machine.

The four-station workholders and associated tool heads are mounted on the front of the machine headstock. Components are transferred from the main spindle of the automatic to the loading station of the first workholder. After being indexed 90 degrees, the work is transferred to the next workholder, and so on. Tool heads arranged radially around the workholders carry out such operations as milling, cross-drilling, back-drilling, and threading. Indexing of the workholders is in time with the machine's cycle.

Several builders showed machines capable of doing the work of two or more distinct types of machines. An example of this is the American broaching machine that can be used either as a horizontal or a vertical machine. Another: an Italian grinder with wheelheads on a rotatable column, which is a sideway grinder with one head in position, or is a segmental-wheel grinder with the other head in position. Fitted with a rotary table, the machine can be used for cylindrical grinding.

Two interesting new thread-cutting ideas were seen. One of these was on a Swiss copying lathe, in which the thread profile is generated by a copying method. The other was a Belgian attachment for screw-cutting lathes, which hydraulically controls an automatically decreasing infeed.

US Exhibits

Exhibits of US machine tool makers at Milan included Gleason Works' No 70 spiral bevel generator that is so rigid that it can rough and finish gears up to 72-in. pitch dia max, and mating pinions up to 10 to 1 ratio and ¾ dp, or a depth of 2⅞ in.

Cone Automatic Machine Co showed its latest eight-spindle bar machine, the Cone VE 1⅝-in. Automatic. Tooling area of this machine is 12-in. longer than the previous

MILAN FAIR Continued

model, and a longer main-end slide has a total travel of 6½ in. Machine will accommodate die heads for threading work of maximum collet capacity, and for heavier attachments for use with carbide tools. Minimum work cycle is 3 sec, maximum is 6 sec. There are 42 work spindle speeds ranging from from 125 to 2470 rpm, with a two-train range of tool feeds for each work spindle.

Gardner Machine Co's double-head disc grinding machine is equipped with a feed-through fixture and special loading attachment that permits loading of race rings from the machine's rear, and inspection for size at the same point, after they have passed through the grinding disks.

Sundstrand Machine Tool Co's No 0 Centermil centers and end faces shafts in preparation for machining between centers on copying and other lathes. Machine accommodates shaft dias from ¾ to 3½ in., varying in length from 5 to 48 in.

Landis Tool Co's multi-wheel grinding machine, the Type H-IW, permits simultaneous grinding of several dias on the same shaft. And provision is made to profile dress wheels, so that tapers and odd shapes can be finished ground. Max work swing is 10 in., and max OD across the grinding wheels is 30 in. Standard grinding wheel dia is 36 in., worn wheel size is 26 in. diameter. Machine has hydraulically operated rapid and slow feeds. By releasing hinged clamping blocks, the entire spindle and spindle-bearing assembly can be lifted out to allow retaining rings and wheels to be slipped over the bearing assembly.

Colonial Broach Co's multi-purpose broaching machine shown at Milan is a horizontal-vertical model capable of four different basic broaching or press operations. The Colonial 4 will handle push and pull-down broaching as well as regular horizontal broaching operations. In the vertical position, the Colonial 4 requires floor space of only 84 x 40 in.; in the horizontal, 132 x 40 in.

Fellows Gear Shaper Co's line of inspection instruments exhibited at Milan included the No 12CT, which can make taper checks in addition to inspecting cone and tooth spacing of external spur and helical gears. This model can now also be used to ascertain composite error, by means of a new hand rolling head which is interchangeable with the circular pitch head for tooth-spacing inspection. Another model locates only cone and composite error.

US exhibitors at Milan included: Allen-Bradley, American Tool Works, ARO Equipment Co, Blackhawk Mfg Co, Brown & Sharpe, Cincinnati Milling, Colonial Broach, Cone Automatic, Fellows Gear Shaper, Gardner Machine, Giddings & Lewis, Gisholt, Gleason Works, Henry & Wright, Jacobs Mfg Co, Jones & Lamson, Kearney & Trecker, Landis Tool, Latrobe Steel, Michigan Tool, Micromatic Hone, Minnesota Mining & Mfg Co, National Acme, New Britain, Sheffield, Simonds Saw & Steel, Sundstrand, Sunnen Products, Timken, Tubular Micrometer and Twin Disc Clutch Co.

British Exhibits

Among British exhibits, one of the completely new machines was the BSA Metric 18L single-spindle automatic screw machine, shown for the first time. Built to metric specifications, it is intended primarily for users of automatics who require this particular specification. With a capacity of 18 mm, it follows the basic design of BSA machines, with an open front to permit access to tooling and rapid clearance of chips.

An important feature is a straight rapid withdrawal and advance mechanism which enables the turret to be rapidly retracted and advanced to the same position without indexing, and greatly facilitates such operations as deep hole drilling.

A British-built Conomatic six-spindle bar automatic with a 20-hp motor gives a range of 28 spindle speeds. Speed change of individual work spindles is by rotating opposed tool spindles on the main end slide. Three auxiliary spindles can be used on the main end slide, with travel independent of that of the slide. Capacity is 1⅝ in.

Central Tool & Equipment Co exhibited the Centec 3P milling machine, a version of the Centec 3 with a hydraulic tracer unit for profile milling. Extremely close tolerances are claimed for this machine because the hydraulic system automatically compensates for mechanical errors caused by deflections of components between tracer valve and spindle.

British-built Cincinnati milling machines were shown on the American Cincinnati stand, and British-built Kearney & Trecker machines were exhibited by CVA Jigs, Moulds & Tools Ltd on the K & T stand.

Churchill-Redman showed the Churchill-Cleveland O-Cycle Rigid-hobber a single-spindle machine for hobbing gears and spline shafts at both high and conventional speeds and feeds. Hob feed is steplessly variable from 0.04 to 1.8 ipm, and speed ranges from 70 to 500 rpm. Vertical cutting feed of work is from 0.006 to 0.25 ipr. Standard equipment is the continuous automatic axial traverse of the hob to distribute wear.

European Exhibits

An interesting exhibit at the Pitler (Germany) stand was a multi-spindle bar automatic produced in cooperation with National-Acme. Collets, pushers, bushings, and toolholders correspond to those of the original Acme-Gridley machines. The PRB 50/6 has a maximum capacity of 2 in., and a stock feed of 10 in. with a maximum turned length of 7 in.

Change wheels can be used both with the spindle and cam drum shaft drive, and the same toolholders will fit on any of the radially operating slides. Attachments include a polygon milling attachment, a rotating milling attachment, and a machining slide for long work.

Among jig borers, a new refinement seen on the Herbert Lindner machine was a preselector device to enable the next table position to be set during operation. When a button is pressed, the table moves automatically in rapid traverse to the selected position and requires only fine adjustment by the optical measuring equipment. A selector permits setting by either the datum method or the additive method, and a further position of the selector provides for milling feeds.

For either batch or quantity production, the Staehely automatic gear hobber is equipped for magazine feed, and includes automatic hob shift and full automatic cycling. It will handle work from 2 in. to 8 in. in dia, and shafts up to 12 in. long.

A recent development by Maxinovo is the Profilomatic double-slide copying lathe for chucking work. It has independent duplicating units located on a special cross-slide, each of which independently follows the templet. While the rear slide, usually used for internal and facing work, is cutting one profile, the front slide, following another profile, turns the outside diameters and faces.

CAPITAL GOODS EXPORTS:

US Must Look to Less-Developed Countries

New study of US capital goods exports shows that while machinery and equipment exports are currently below 1952 levels, our neighbors to the north and south, plus industrial expansion in the "less developed" countries, offer a tremendous potential market for machine tools and other capital goods and equipment

CHICAGO—The export market for US capital goods no longer lies in the world's highly industrialized, but also highly competitive countries. Today, the major potential markets are the "less developed" countries such as those in Africa, parts of Asia and Oceania, plus of course, today's No 1 and No 2 US capital goods export markets—Latin America and Canada. Those are the findings of a continued survey undertaken by Machinery & Allied Products Institute's Council for Technological Advancement. The survey makes these major points:

Our Biggest Export: Machinery

• Machinery and equipment comprise by far the largest US export commodity group. In 1952, for example, the $3 billion in machinery and equipment exported accounted for 20% of total US exports, or almost 25% of non-military exports. For this reason, capital goods producers have a large stake in the formation of national policy affecting foreign trade.

• This importance of the export market to capital goods producers is pointed up by this fact: during the last few years, about 12% of total US machinery and equipment sales have been in these markets—ranging from 4% for railroad and transit equipment to almost 23% for tractors, parts and accessories.

Exports Still at High Levels

• Exports are currently declining from the record levels of 1952 but are still at a high level by all previous standards, but exports in March of this year reversed the decline, at least temporarily, indicating that more effort on the part of producers to capture the overseas market could swing the balance up again.

• The largest single capital goods export market today is Latin America, which has displaced Europe in its prewar role as America's largest overseas capital goods customer. And while not so large as the Latin American market, Canadian purchases of US machinery and equipment have shown the sharpest rise of any area. If this rate of increase is continued for any time, Canada will displace Latin America as our top customer.

• Although lagging behind other marketing areas, European purchases of US capital goods have held up remarkably well in the last two years despite tapering off of US economic aid.

• While the above trends apply to machinery and equipment exports generally, metalworking machinery is an exception. This category, which made up 10% of total capital goods exports in 1952, consists of machine tools, rolling mill and foundry equipment, presses, portable tools, parts and accessories and miscellaneous equipment. Metalworking machinery is still largely dependent upon Europe as an export market, while most other types of capital goods rely on Latin America and Canada as their top export markets.

• Areas such as Africa, Oceania and parts of Asia, up to now relatively small tradewise, are growing stronger economically and will grow even faster under the impetus of such trade plans as those of the Southeast Atlantic Treaty organization and Export-Import Bank.

End of an Era

LAST PACKARD TO BE MADE AT THE EAST GRAND BLVD PLANT gets an assembly assist from Neill S Brown, Packard car manufacturing manager, left, and M E Macaulay, general factory manager, marking transfer of Packard operations from the plant where Packards have been built since 1903 to a modern, one-story plant on Conner Ave, Detroit. Moving job involves transplanting three miles of conveyor lines, 5000 heavy tools, scores of hoists and other equipment. Final assembly will begin at the Conner Ave plant early in November

AFL's TRUCE: Carpenters and IAM

Thorniest rivalry in AFL's 73-year history—the wrangle between AFL's International Association of Machinists and AFL's Carpenters' Union over installation of machinery in new buildings—is over, with the Machinists back in their place in the AFL sun

LOS ANGELES—Rival unions of the American Federation of Labor are taking big steps down the road toward peaceful settlement of their intra-AFL disputes. And the International Association of Machinists, which has walked in and out of the AFL twice for a total of eight years, is leading the way.

New Jurisdiction

It all came about at AFL's 73rd Convention here in late September, when union officials drew up new peace and jurisdictional plans to end a 40-year fight between IAM and the AFL Carpenters' Union over who has the right to erect machinery in new buildings.

Before the Convention wound up, 800 delegates had cheered this key agreement as one that will break the back of the jurisdictional disputes problem. And at Convention's end, the IAM was back in full AFL favor for the first time since its last return to the fold. This was reflected in the Convention's unanimous approval of IAM's demand for a 35-hour workweek to offset unemployment. IAM's demand is beamed principally at aircraft plants.

10% of IAM Jobless

IAM leaders estimate that nearly 10% of their 900,000 members are currently out of work, while even more are working under 40 hours. Only in a few scattered areas are members working overtime. IAM's argument is that greater productivity and the skilled labor force are now sufficient to maintain production, but that a reserve of new employees for an emergency would result from a 35-hour week.

The AFL will fight for the 35-hour week on two fronts: (1) its legislative team in Washington will pressure Congress to amend the Wage-Hour Law, which now calls for a 40-hour week, and (2) individual unions

Longest Continuous Flow Coating Line

EL SEGUNDO, CALIF—The world's longest continuously moving flow-coating paint line, capable of flow coating 6400 Navy jet aircraft parts per hour, is now in operation at Douglas Aircraft Co's plant here. The automatic paint line consists of an electrically driven overhead monorail system that meanders through the plant for a half mile at speeds from 10 to 30 fpm, receiving sheet metal plane parts from five different

Upstairs, Downstairs . . .

NEWLY FORMED JET AIRCRAFT PARTS ARE HOOKED ON at one of five loading stations along the flow-coating conveyor. Conveyor has 6400 hooks

Into the painting chamber . . .

INTO THE BASEMENT for processing and painting go the parts

Bury the Hatchet After 40 Years

will go after the shorter workweek across the bargaining tables. With the entire Federation supporting the move, the Machinists may make this one of their key demands.

Agreement With Other Unions

While girding itself for coming battles with management, IAM has entered into friendly negotiations with other AFL unions over jurisdiction of jobs. Behind the convention scenes, IAM President Al J Hayes huddled with officials of the International Brotherhood of Electrical Workers and the AFL's Textile Union to iron out job assignments, on the grounds that "if we can settle the Carpenters' dispute, we can settle anything."

Basically, that agreement spells out just where IAM men and the Carpenters shall handle installing, erecting and repairing of machinery and equipment. In some cases, like the installation of steam, hydro and gas turbines, the work is to be performed by crews made up of an equal number of members from both unions.

No Work Stoppages

Both sides pledged that there will be no work stoppages or strikes resulting from any disputes that may arise. Such disputes will go first to local, then to international union representatives. Then, if they aren't settled, international presidents of both unions are authorized to pick an arbitrator to make a binding ruling. The new pact looks like it's earmarked for success, because negotiations between the two unions failed in the past when they tried to talk out their differences without an outside mediator. The last time, however, when they called in John T Dunlop, head of the Construction Industry-Labor Joint Board of Jurisdictional Disputes, and Rev William Kelly of Catholic University, the mediators kept the unions talking through 27 meetings over the last year. When the bargaining got tough, they made the labor leaders stay and thrash out their differences. That'll be the rule from now on.

AFL and Atomic Energy

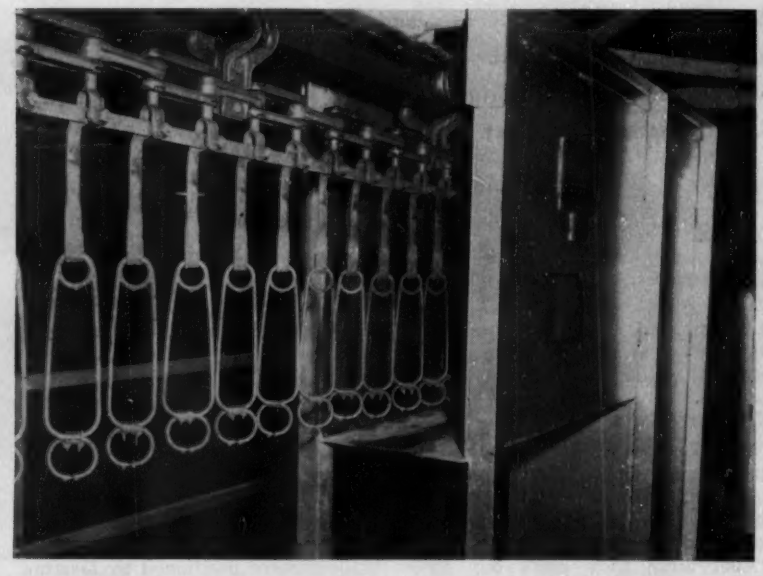
AFL has its eye on the Atomic Energy Program, too. The Federation is chartering new Metal Trades Councils to organize and bargain for workers in private plants developing atomic energy. It wants to bring rival unions and unorganized workers in atomic energy plants into the fold. AFL's principal goal: the 10,000 atomic energy engineers and scientists who are not members of any union.

Paints 6400 Parts per Hour at Douglas

locations. Cleaning and painting operations are performed in a multiple process tunnel located in the plant's basement, where the parts move through automatic washing, rinsing, drying and chemical treatment. If fire breaks out at any point, the system stops automatically, all fans and blowers halt, paint flow turns off, heat is cut, and carbon dioxide pours into the sumps and into all closed drains along the system.

Goes Douglas's . . .

PARTS ENTER cleaning and painting tanks in a 378-ft tunnel



2100-ft-long flow-coating line . . .

PARTS PAINTED, THE HOOKS ARE CLEANED IN AUTOMATIC DIP TANK —then they're ready for loading again. Hooks carry parts from 1 sq in. to 6 ft long

PART OF THE EAST GERMAN MACHINE-TOOL HALL AT LEIPZIG. A new wing was added this year

LEIPZIG FAIR 1954: Iron Curtain

Both sides of the Iron Curtain made a pretty impressive showing of machine tools this year—the Western World at Milan and Russia and its satellites at Leipzig. Here are eyewitness impressions of our London man, David Scott, of the Reds' Leipzig Fair

LEIPZIG, GERMANY—Communist countries are making rapid strides in machine-tool design and manufacture. This was evidenced at the Leipzig Fair, showcase of machine tool progress for Russia and her satellite nations.

Germany Leads Parade

East Germany led the machine tool parade at Leipzig. A Dutch importer of machine tools, who has a first-hand knowledge of East German equipment summed it up this way, "Everything they can't buy they make themselves. In two years they make big competition." Three-fourths of East Germany's trade is with the Soviet Bloc, but increasing attention is being paid to the primary producing countries of the Middle East and Asia.

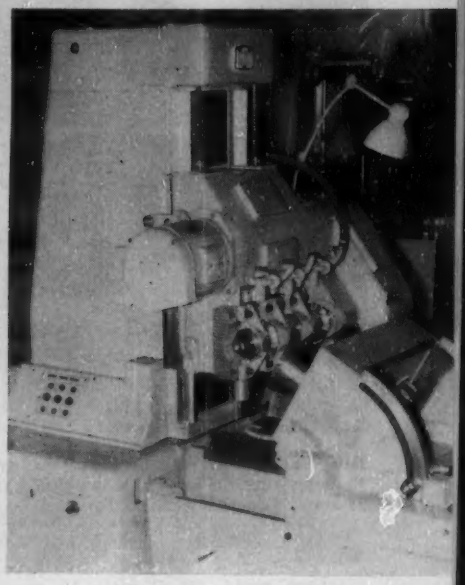
Transfer Line

An example of the machine tool development stage reached by East Germany was the showpiece of that country's Leipzig exhibit—a 14-station transfer line that completes all operations on half of a motorcycle engine housing, including pre-boring of the cylinder base. Fixtures on trolleys were positioned by locating studs at each station, where they were hydraulically clamped to the rails. A hydraulically operated transfer bar with 900mm stroke engaged the trolleys with spring-loaded pawls. This particular line is destined for a German plant, but comparable lines are offered for export. In fact, all of the several hundred machines at Leipzig are up for sale, including those produced for the first time in Germany's East Zone.

Among those types were multi-spindle automatics, lapping and honing machines, optical profile tool grinders, and a two-spindle gear hobber. Germany's largest gear hobber is for 5-meter-dia gears. East Germany's output of milling machines is being streamlined by applying the same basic design to a new series of vertical, horizontal and universal millers. These will be available for export late next year. Finish of the German machines is of a high standard.

15 Chinese Machines Shown

Chinese exhibition provided evidence of a move toward self-sufficiency, although it will be some time before that country sells its

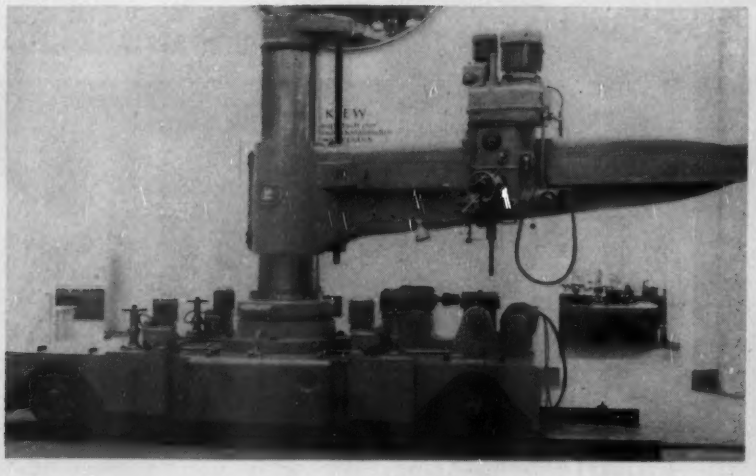


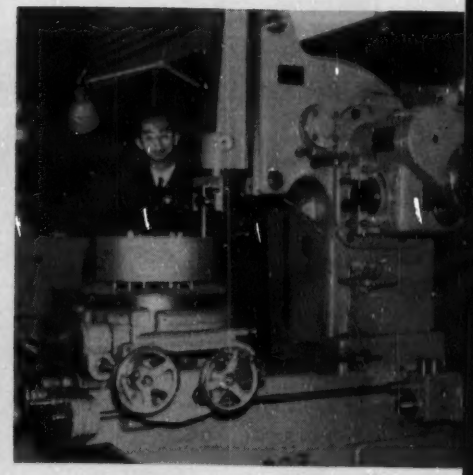
Leipzig Displayed East German...

TRANSFER LINE WITH 14 STATIONS was the main attraction at the East German exhibition hall. This line had 120 spindles milling, drilling, boring and tapping to produce 20 motorcycle engine half-housings per hour. Fast conveyor returned empty pallets to loading positions. This line is designed for installation in a motorcycle factory at Zschopau, East Germany

DOUBLE-SPINDLE HOBBER rough cuts two spur or bevel gears at once. The aim is to free precision gear cutters from coarse work. Downward cutting head feed is in 6 steps at 125 mmpm max

Is Lifted to Show Machine-Tool Progress



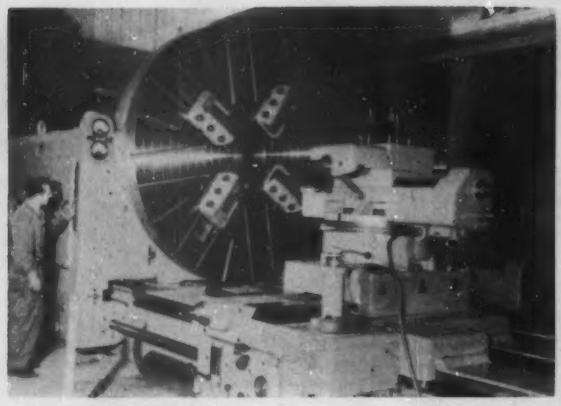


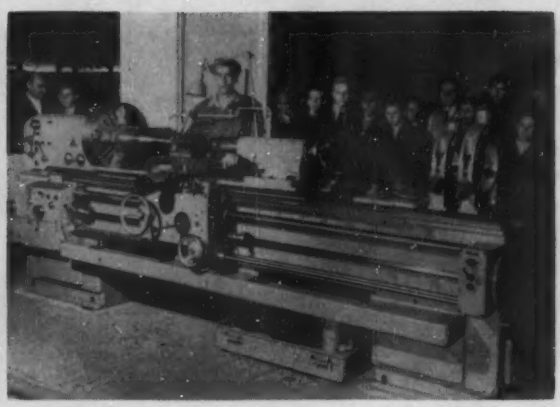
Russian...

RAIL-MOUNTED RADIAL DRILL FROM RUSSIA carries nine electric motors. Wheels are driven by the forward power unit. Four C-clamps are raised simultaneously by individual motors to secure the truck to the rails. This Russian rail-mounted machine's maximum radius is 3400mm. And its spindle speeds range from 32 to 1700 rpm

Chinese...

MECHANICAL SLOTTER is proudly displayed by its Chinese designer. Ram stroke is from 25 to 160mm, with 120 per min max. Table has 15 longitudinal, cross and circular feeds





Czech and...

BIG SKODA LATHE has 2850mm swing over bed, and 10-meter turning length. Max spindle speed is 80 rpm with 24 steps. Handles work to 140 tons

CZECH LATHE's spindle is driven by two motors to eliminate current surges. Max spindle speed is 1400 rpm in 22 steps. Swing over bed: 500mm

machine tools. Of China's 15 machines on show, most of them were made in China for the first time this year. Their design and finish showed considerable improvement over those previously displayed at Leipzig. But of special significance was a notice on every Chinese machine showing the Russian machine from which it was copied. This is solid confirmation of the move toward Soviet Bloc design standardization. Copying of Russian designs applies also to jigs and fixtures.

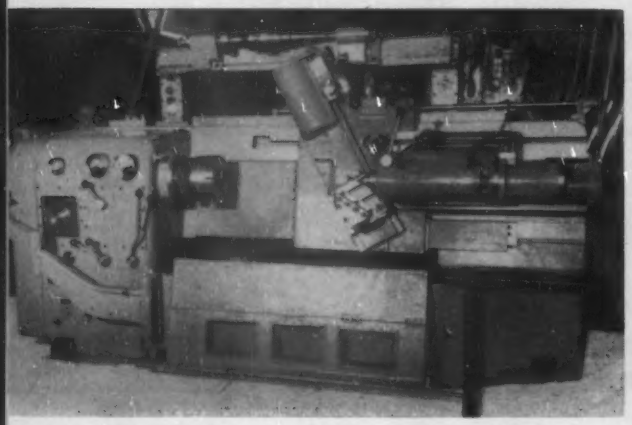
This year's Soviet exhibition at Leipzig was smaller than last year's, and machine tools were retired from their place of honor in the center hall to make way for textiles and clothing—in keeping with the USSR's new emphasis on consumer goods.

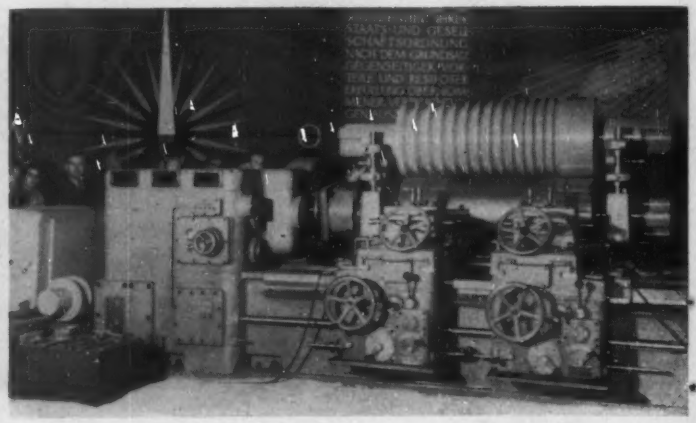
The dozen Russian machines at the show hardly did justice to that country's current output. For example, the USSR is now reported to be making 19 basic types of automatic lathes, including six single spindles, eight four-and-six-spindle bar automatics up to 80mm, two horizontal chuckers and four vertical-chucking automatics. Largest swing displayed was 400mm on a six-spindle vertical.

Poland's largest machine was a double-column vertical boring mill with a 3200-mm dia table. This comes in a smaller, 2000-mm dia version, too. Other machines shown were a hydraulic tracer lathe, an internal grinder, several millers.

Czechoslovakia emphasized outsize machine tools, displaying a 90-ton lathe, a 70-ton horizontal boring mill, and a 50-ton plano-miller.

Western nations exhibiting included West Germany, Belgium, France, the United Kingdom, and Switzerland.





Polish Machine Tools

TRACER LATHE features tool below workpiece that simplifies swarf disposal. Master is carried high over the bed, and slide is hydraulically controlled. Pneumatic tailstock is foot operated

THIS ROLL FINISHING LATHE WON A PRIZE. It has 16 hydraulically selected spindle speeds from 0.71 to 53 rpm. Ribbed, box-section bed handles work up to 3500mm long, weighing 10 tons

McGRAW-HILL

WORLD News of Metalworking . . .

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GM's $6-Million Antwerp Expansion To Double Its European Auto Output

BRUSSELS—A $6-million expansion of General Motors Corp's assembly facilities at its Antwerp automobile and truck plant is expected to double Continental output. Expansion plans were announced here by GM President Harlow H Curtice following a tour of the plant.

Said Mr Curtice, "We expect to begin construction of the large addition immediately and we hope to have the additional capacity available to us by the middle of 1955. The new program will increase GM's investment in the Antwerp plant to $20 million."

According to Mr Curtice, the new plant addition will require employment of at least 800 more workers. Currently, GM Continental employs about 2600.

Mr Curtice said that the expansion is necessary to keep pace with a growing automotive market in Belgium, Luxembourg and the Netherlands. He estimated that by 1960, the Benelux countries will provide a market for 166,000 motor vehicles a year—some 26,000 more than are expected to be sold this year.

AUSTRALIA REPORTS SEVERE STEEL SHORTAGE

MELBOURNE—A severe shortage of most types of steel is hampering the Australian industrial effort and is adversely affecting the country's building trades—to the extent that imports of steel must be increased substantially.

At present, Australian steel output is barely meeting half of current demand. And overseas delivery dates are getting longer and longer. Most imported steel comes from Britain, Belgium and France. Both the United States and Japan are offering steel in large quantities, but current exchange rates make prices almost prohibitive, although some US steel has been purchased.

Rapid expansion of local industry and increased building activities are making the situation critical. Big stocks of imported steel, unsaleable about 14 months ago, are now reported as completely exhausted.

CHILE ASKS WEST GERMAN INDUSTRIAL AID

BONN—Plans for West German participation in the industrial development of Chile call for the building of new harbors and roads, and for increased sale of German industrial tools and equipment to Chile.

Chile's Economic Affairs and Colonization ministers on a visit here told newsmen that West Germany will be asked to help turn the port of Arica into one of South America's major harbors, and to help build road links from Arica to La Paz, Bolivia, and South Chile.

Chile, they said, wants German capital and machines. And, they hinted, if German capital is interested in looking for oil in Chile, "our people and leader are interested." A full trade treaty between the two nations will be concluded shortly.

BAN SALE OF JAPANESE SEWING MACHINES TO US

TOKYO—Japanese sewing machine heads can no longer be exported to the United States, under terms of a ban recently issued by Japan's Ministry of International Trade and Industry. The reason: Japanese manufacturers have consistently been violating the check price of $14 per head to prevent dumping. The ban will be lifted only when manufacturers show evidence that they will abide by the rules in the future.

Japan's sewing machine production in the January-June 1954 period was 624,000 heads, 520,000 of which were exported, 70% to the U.S.

EGYPT TO BUILD RR STOCK

CAIRO—Egypt's National Production Council is considering plans to build a local plant for production of railway carriages and goods wagons. Specialized foreign firms are invited to participate in formation of an Egyptian firm for this purpose.

Russia's Giant Plano-Miller

SMALL MILLER IS PLACED ON THE BED OF THIS HUGE PLANO-MILLER for comparative purposes. The large miller, built by Russia's Yefremov Factory at Novisirsk, can handle work weighing up to 100 tons and measuring 13 x 13 x 40 ft. Though no further details have been provided with the picture, this photograph brings up some interesting questions: How many such tools does Russia have? Isn't the similarity to Western-made machine tools pretty striking? Just what is the cost in Russia's industrial effort to build it compared to the US?

F Steele Blackall III

R W Powell

Virgil C Rice

Names in the News . . .

F Steele Blackall III has been elected a vice president of the Taft-Peirce Manufacturing Co, Woonsocket, RI, manufacturer of machinery and tools. Mr Blackall is also assistant treasurer, and a director of the company.

Henry A Holberson has been elected vice president and general manager of Youngstown Metal Products Co, a subsidiary of Youngstown Sheet & Tube. He succeeds **David W Thomas**, who died Aug 24. Mr Holberson joined the company in 1935; he served as tool and die designer, engineer, and was named assistant vice president in 1951.

John W Kelly has been promoted from engineering manager to vice president in charge of engineering for General Metals Corp's Adel Precision Products Div, Burbank, Calif, manufacturers of aircraft hydraulic and pneumatic control equipment.

Robert H Davies has been appointed vice president in charge of engineering for the Parker Appliance Co and its subsidiaries. Mr Davies joined the firm in 1939. He has served as technical service manager, technical assistant to the general sales manager, and in 1946 was named engineering manager.

William D Mathers has been named assistant manager of forging sales with headquarters in the Cleveland plant of Aluminum Co of America. He joined the American Magnesium Corp, an Alcoa subsidiary, in 1941. In 1947 he transferred from Buffalo to the New York district sales office, where he has been specializing in aircraft sales.

R W Powell has been appointed general sales manager of Hydraulic Press Manufacturing Co's Machinery Div, which includes the metalworking and process press division, the plastics and the die-casting machinery divisions. Mr Powell has been associated with the company for the past 18 years in various executive capacities; since 1949 he has been sales manager of H-P-M's Plastics Machinery Div.

Charles S McIntyre, formerly vice president and secretary of Monroe Auto Equipment Co, Monroe, Mich, has been elected an executive vice president of the company. **C S McIntyre III** has been made secretary, and **H J Althaver,** assistant secretary, has the additional post of assistant treasurer.

Dr R C Gibson has been appointed assistant vice president of Parker Rust Proof Co, Detroit. **E W Richards,** formerly service manager, has been made technical director, and **R I Peterson,** formerly assistant, moves up to the post of service manager.

H L Wentworth, chief design engineer for Continental Industrial Engineers, Inc, Chicago, has been named vice president and chief engineer. **R E Angley,** chief project engineer, has been made manager of estimating and sales engineering for complete plants, production lines, special machines, and industrial furnaces. **W G Wilson,** formerly chief draftsman, has been made chief design engineer. **R E Liston** has been named purchasing agent. **A C Graebner** has joined the staff as sales engineer.

Virgil C Rice has been elected vice president of manufacturing of Borg-Warner Corp's Norge Div. Mr Rice re-joined Norge last August as director of manufacturing after an 11-year absence; he was an executive in Norge's manufacturing operations from 1927 to 1943. Prior to a year spent as vice president in charge of manufacturing of Ronson Art Metal Works, Newark, NJ, Mr Rice was vice president and director of manufacturing of the Bendix Home Appliances and the American Kitchen Divs of Avco Mfg Co from 1943 to 1953. **W F Bach** has been named manager of production, and **W N Fooshee** manager of manufacturing costs, two new positions at Norge. Both men were formerly associated with the division. During the interim Mr Bach was production manager at Bendix, and Mr Fooshee, Clyde, Ohio, plant manager.

William J During, head of Precision Castings Co, Syracuse, NY, has been elected president of the American Die Casting Institute. **George Ralls,** Pressure Castings, Inc, Cleveland, was elected vice president.

Clifford W Sweeney and **Clayman C Shafer** have been appointed production manager and chief methods improvement engineer, respectively, of Republic Aviation Corp. Before joining Republic Mr Sweeney served for 28 years in several production positions with General Motors Corp. Since 1946 he has held the posts of director of production and material control for GM's Fisher Body Aircraft Div at Grand Rapids, and Buick-Oldsmobile-Pontiac Div plants at Kansas City, Kan, and Atlanta. Mr Shafer, a veteran of 15 years in the aircraft industry, has recently been serving as works manager of the Chase Aircraft Co in Trenton, NJ.

Rear Admiral A J Wellings, USN (Ret), has become associated with the Harvey Machine Co, Torrance, Calif, as technical consultant. The company produces aluminum extrusions, bar and forging stock, and aluminum screw machine products. Admiral Wellings has served as special assistant to the chief of naval materiel, inspector of naval materiel at Bethlehem, Pa, and as head of the metallurgical and test division of the naval gun factory in Washington, DC.

Walter O Lewin has been made general manager of the newly-acquired Champion Div of The Steel Improvement & Forge Co, Cleveland. He was formerly vice president and general manager of The Champion Forge Co. **Deward H Hardesty** has been appointed superintendent. He has recently served as plant manager, forge plant, of Ford Motor Co's aircraft division in Chicago.

Charles W Sawhill has been named general sales manager of Aeroquip Corp's West Coast subsidiary, Aero-Coupling Corp, Burbank, Calif. He moves up from the post of industrial sales manager.

Arthur J Miller, Jr, has been elected president and general manager of Chicago Wheel & Mfg Co. The former treasurer and factory manager of the company's Valparaiso, Ind, plant succeeds **A J Miller, Sr,** named chairman of the board. **Henry E Miller** has been named vice president and general production manager; **Henry M Mann,** treasurer and chief of sales engineering; and **Arthur T Dalton,** secretary and general sales manager. **I Danielson,** long associated with the firm, was elected vice president emeritus, and will continue on in his capacity of adviser on financial matters.

C D Galloway, Sr, has joined Chambersburg Engineering Co, Chambersburg, Pa, as special consultant on automatic handling systems for the Impacter, the company's forging hammer that forges horizontally. Mr Galloway was associated for 34 years with the Electric Storage Battery Co, Philadelphia, and at the time of his retirement in 1951 he was factory engineer for all plants. **Brigadier General R W Daniels, USA (Ret),** has been appointed adviser on special plans. During World War II he was chief ordnance officer for the Army Ground Forces, and later the Pacific Ocean Areas. In 1951 he headed the ordnance programs for Foreign Aid in Washington.

Tom Miller, vice president of Package Machinery Co, Springfield, Mass, has been elected president of the Packaging Machinery Manufacturers Institute. **John B Wilson,** president of Wright Machinery Div, Sperry Corp, Durham, NJ, and **Mills W Waggoner,** general sales manager of Better Packages, Shelton, Conn, were elected vice presidents.

Robert B Heppenstall, Jr, has been named general manager of the Bridgeport, Conn, plant of Heppenstall Co, steel forging manufacturer. He succeeds **Alfred J Porter,** who died recently. Mr Heppenstall has been associated with the company since 1945, and has been manager of market research for the past year.

Charles E Vanderpool has been promoted to the post of sales manager for the Rotor Tool Co of Cleveland. Mr Vanderpool joined the company in 1947 as sales promotion and advertising manager. Prior to that time he was sales manager of the Cleveland Pneumatic Tool Co.

Arthur J Miller, Jr

Charles E Vanderpool

Harold Wrigley has been appointed works manager of the Barry Corp, Watertown, Mass, manufacturer of shock and vibration-isolation equipment. **Charles S Basney** has been named new products manager. Mr Wrigley joined Barry in 1951 as plant superintendent; Mr Basney, a member of the firm since 1946, has been production control manager for the past two years.

F A Henry, formerly assistant to the general manager of A O Smith Corp, has been appointed general manager of the corporation's Pacific Coast works at Los Angeles. He succeeds **A W Shuman,** who has resigned.

C E Cummings has been named manager of American Can Co's Lemoyne, Pa, plant, succeeding **G A Vaughan,** temporarily assigned as assistant manager of the firm's Philadelphia factory. Mr Cummings had been manager of Canco's plant in Tampa, Fla. **R A Fistere,** formerly superintendent of manufacture, Atlantic division, succeeds Mr Cummings.

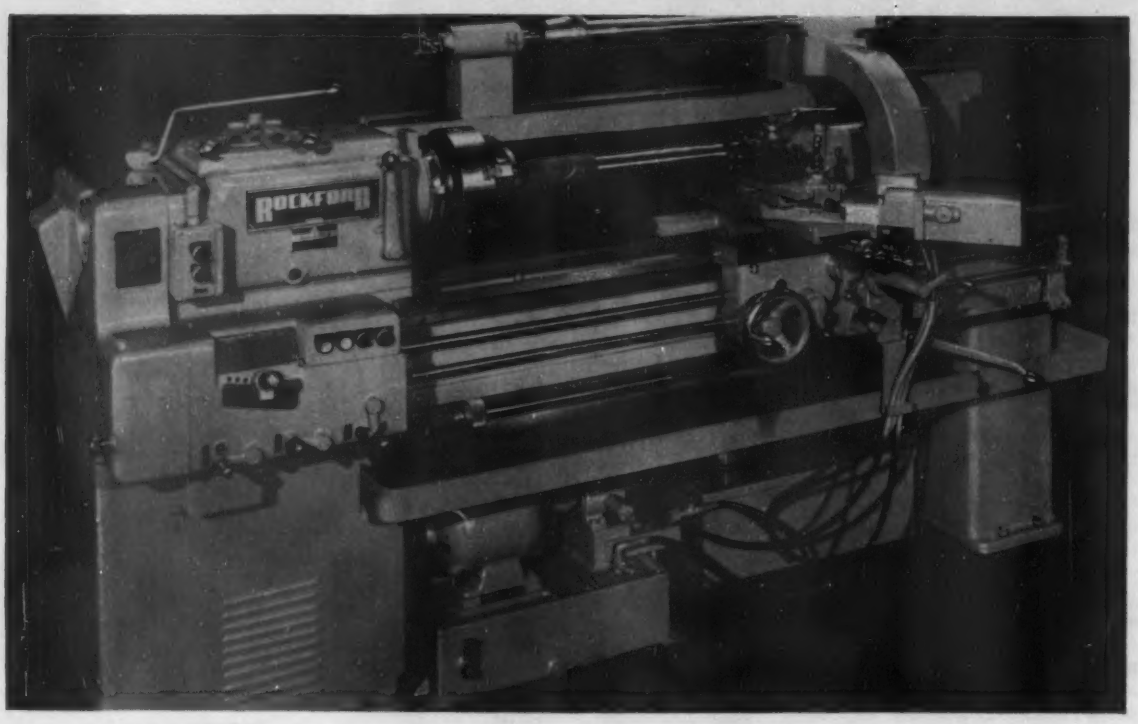
Donovan Joslin has been named plant manager of Trailmobile's Cincinnati plant. He joined the company in 1929; he has been general superintendent of the plant for the past two years.

OBITUARIES

Milton O Cross, Sr, 78, founder of the Detroit machine tool firm of Cross Co in 1898, died Sept 25 in Detroit. He invented and patented much gear-making and automatic polishing machinery, as well as automobile accessory equipment and heating systems. Prior to World War I Mr Cross built his own machine to process gears, and during the war made these machines available to other companies. He has been considered a pioneer in the field of automation. An ardent sailor, who had won many R-Class races on the Great Lakes, Mr. Cross died aboard his yacht, the Ardette.

Edward O Seits, 54, manufacturing executive assistant at North American Aviation, Los Angeles, and president of National Association of Foremen, died Sept 13 in Los Angeles. Mr Seits was associated with Wright-Martin, Curtiss, Chance Vought, and Douglas Aircraft companies before joining North American in 1937.

New Shop Equipment,



Geared-Head Lathe Has Tracer Control

Rockford Machine Tool has added a tracer lathe to its standard line of machine tools. The basic machine is an all-geared head, 18-in. engine lathe having 12 spindle speeds, 32 feed changes, and bed lengths from 6 to 12 feet. It is powered by a 5-hp motor and spindle speeds up to 1140 rpm are available.

The tracer control is an adaptation of the "Kopy Kat" duplicator which has been furnished on other machines. All components of the tracer, with the exception of the pump, are manufactured by the Rockford Machine Tool Co.

An entirely independent, sealed pumping unit, featuring a governor-controlled pump, is mounted directly under the chip pan. The tracer valve is mounted on an overarm at operator height. All hydraulic lines from the valve pass through the overarm and along the apron, clear of chips, coolant, and work or operator interference. The system operates at a maximum unit pressure of 400 psi and develops a total holding force of 1650 lb.

The templet carrier is mounted high enough for maximum operator visibility. Safety is increased as there is no necessity to reach over rapidly revolving work or chuck. The templet carrier is furnished for round masters which may be produced on the machine. A flat master attachment is available at extra cost.

The first piece of a small lot can be manually turned on the lathe and then serve as the master. The master is held on centers and to facilitate loading masters, a spring-loaded, lever-operated tailstock is provided. The entire capacity of the machine can be used for tracer work.

The tool slide is positioned on a 45° angle and permits a maximum diameter change up to 6 in. with a swing of 10½" over the carriage. A 4-position toolpost is standard part of toolslide. Convenient 90° infeed control is possible by means of a vertically mounted, double ball crank.

Furnished as standard equipment is an automatic feed throw-out clutch. Screw adjustment permits fine selection of the throw-out point, eliminating danger of work spoilage due to overtravel. A hinged chuck guard prevents coolant from being thrown away from the chuck.

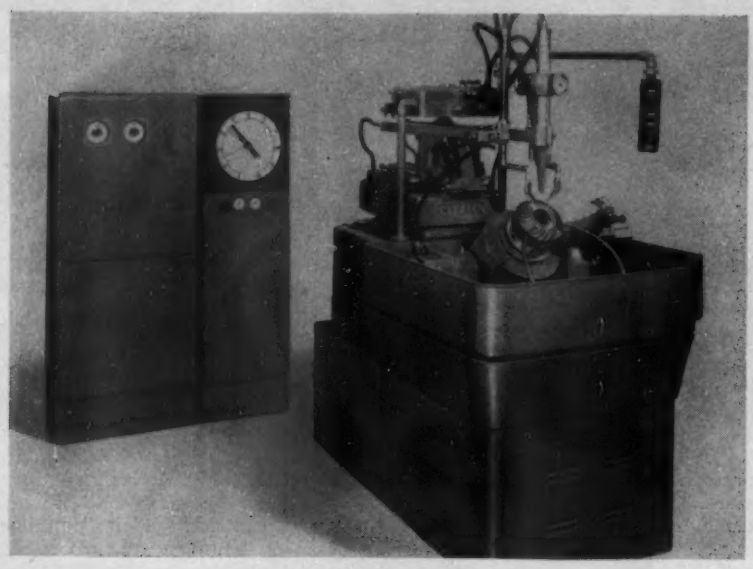
Rockford Machine Tool Co, Dept A, Rockford, Ill

Portable X-Ray Equipment

Designated Baltograph, line features maximum penetration for minimum weight. The self-contained X-ray head of the model rated at 195 kv, 5 ma, weighs only 153 lb and measures 26½x14x8¼ in. The head houses both X-ray tube and high-voltage transformers of new design. All models operate from 110/220-v 60-c.

Balteau Electric Corp, Stamford, Conn

Materials and Parts . . .



Electronic Mechanism Controls Surface Hardening of Gear Teeth

A sensitive electronic control is featured on the new and improved models of Gleason gear-surface hardeners. On these machines oxy-acetylene flames traverse each individual tooth separately. A sensitive radiation pyrometer is focused directly on the tooth being heated, and receives radiant energy from the hot metal. An electronic balancing mechanism translates that energy into forces which control the travel of the burners along the tooth. Operation of the machines is entirely automatic, after the optimum hardening temperature is pre-set by the operator, and the machine is started. Cycling and indexing are automatic.

A wide variety of steels, both forgings and castings, can be surface-hardened on these machines. Since the oxy-acetylene flame is used only as a heating medium, there is no change in chemical composition of the material. As only the gear teeth are heated, and each tooth is heated uniformly and progressively on both sides, there is no measurable distortion, and the region of hardness is limited to the wearing surfaces of the gear teeth.

In normal operation, the machines are indexed so that the teeth hardened successively are non-adjacent. This eliminates the possibility of a change in bore diameter during hardening. The self-quenching nature of this method minimizes internal stresses. However, the machines are arranged to use water or oil quenching if desired, and adjustments are provided so that streams of coolant can be directed as close to or as far from the heating point as desired. Where coarse pitch teeth are being hardened, special burners with cooling orifices can be used if necessary.

The gear-surface hardeners are readily adaptable to hardening the teeth of straight bevel, spiral bevel, Zerol, spur, herringbone, or helical gears.

The No. 1 machine accommodates bevel gears up to 24-in. pitch diameter, spur and helical gears up to 30-in. pitch diameter, and internal gears up to 24 in., outside diameter. The No. 2 machine takes gears up to 120-in. pitch diameter.

The Gleason Works, 1000 University Avenue, Rochester 3, NY

. . . including

Stretch-wrap machine has 360° arm rotation around stationary die . . . . . page 200

Automated 3-station machine drills, broaches, stamps, in continuous cycle . . . . . page 201

Automatic saw does crosscut and drop operations page 204

3-bladed piloted boring tool cleans and sizes . . . . . page 204

Rotary bender operates RH and LH; handles 2½-in. tubing page 206

Mechanism reproduces two form tools from the original page 210

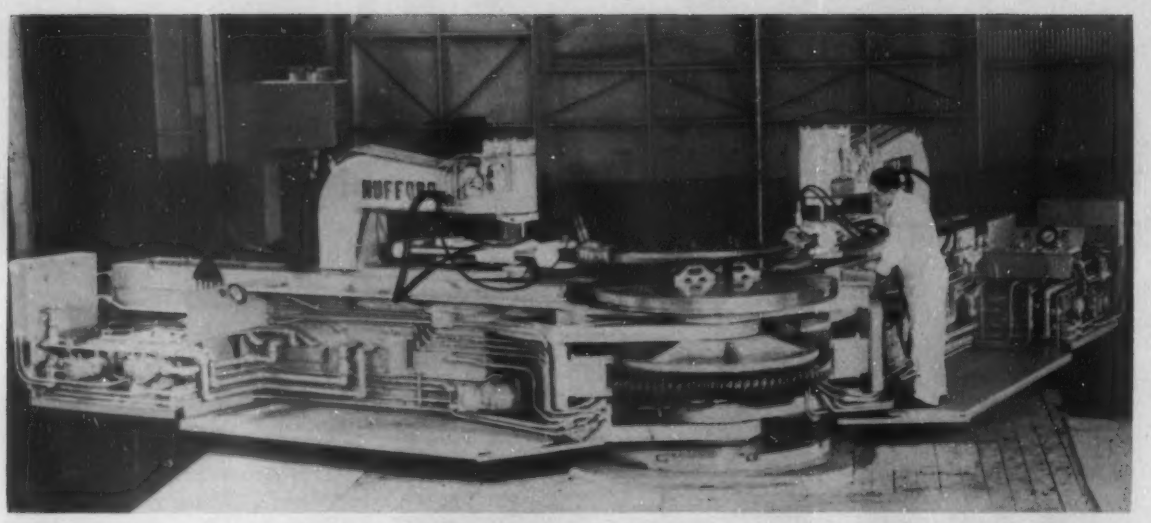
Bench-model welding positioner for downhand welding page 210

Automatic boring machine provides rapid traverse, feed, dwell, and return . . page 216

Centrifugal spray painting unit is controlled; overspray is reused . . . . . page 218

. . . and in Oct 25

Preview of new equipment to be exhibited at the Metal Show



HUFFORD MACHINE with arms partially folded. Part is being wrapped around die in conventional stretch-wrap forming operation. Stationary arm with tension cylinder can be bolted to table top to permit stretching parts from each end

Carousel Model of Stretch-Wrap Machine

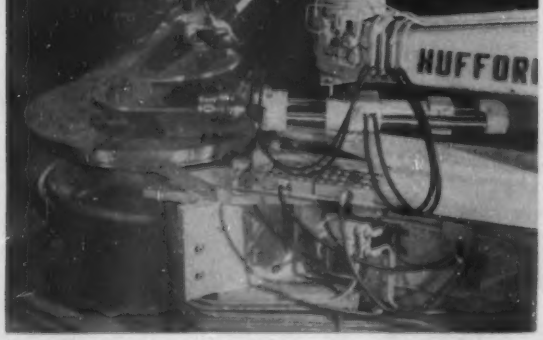
The Carousel model, so named because the operator rides either arm during forming, not only is capable of producing many parts heretofore impossible by a single machine, but still produces all conventional parts from both extrusions and sheets up to 22" wide. With its 360° arm rotation around a stationary die and table the Carousel quickly forms full circles. In addition, the stretch-wrap forming operation can be complemented with a following roller or wiper which operates simultaneously. This roller, attached to one of the rotating arms, may be operated clockwise or counter-clockwise and is unlimited in the number of passes which can be applied to the work. Other Carousel operations include bulldozing, joggling, stretch-straightening, forming reverse bends and "S" curves.

All tension cylinders are double-acting—applying either tension or force to the work. Since they swivel 360° within their brackets, either cylinder end can be utilized to apply effort. Tension cylinders on the rotating arms are adjustable for height, permitting dies to be set at any level. Work can then be lifted or lowered to coincide with die height. Tooling is interchangeable by pulling pin in clevis attached to ram ends.

Arm brackets supporting tension cylinders are power driven along the arms. This facilitates rapid work-length adjustment and also permits brackets to be payed in under tension load, thus compensating for ram movement in the cylinders and preventing the possibility of running out of tension-cylinder stroke on long workpieces.

Controls are provided for each arm and are contained within a pair of steel boxes with cable attachment. A quick plug-in connector enables both control panels to be used on the same arm under the eye of a single operator.

Hufford Machine Works, Inc, 1700 E Grand Ave, El Segundo, Calif

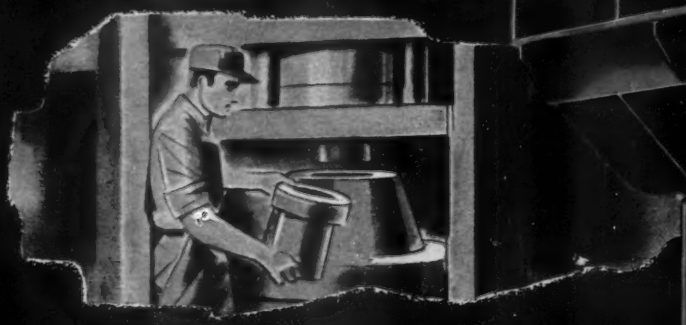


REVERSE BEND becomes simple forming job—either arm moves cw or ccw, rotating under independent control. Reverse bend can also be formed by using stationary arm and tension cylinder as bulldozer

DIE EQUIPPED WITH SERIES OF JOGGLES. After stretch-wrap forming and simultaneously roll-forming part, joggles are completed by reversing tension cylinder and applying force against joggle blocks

COLD EXTRUSION

Calls for H-P-Ms



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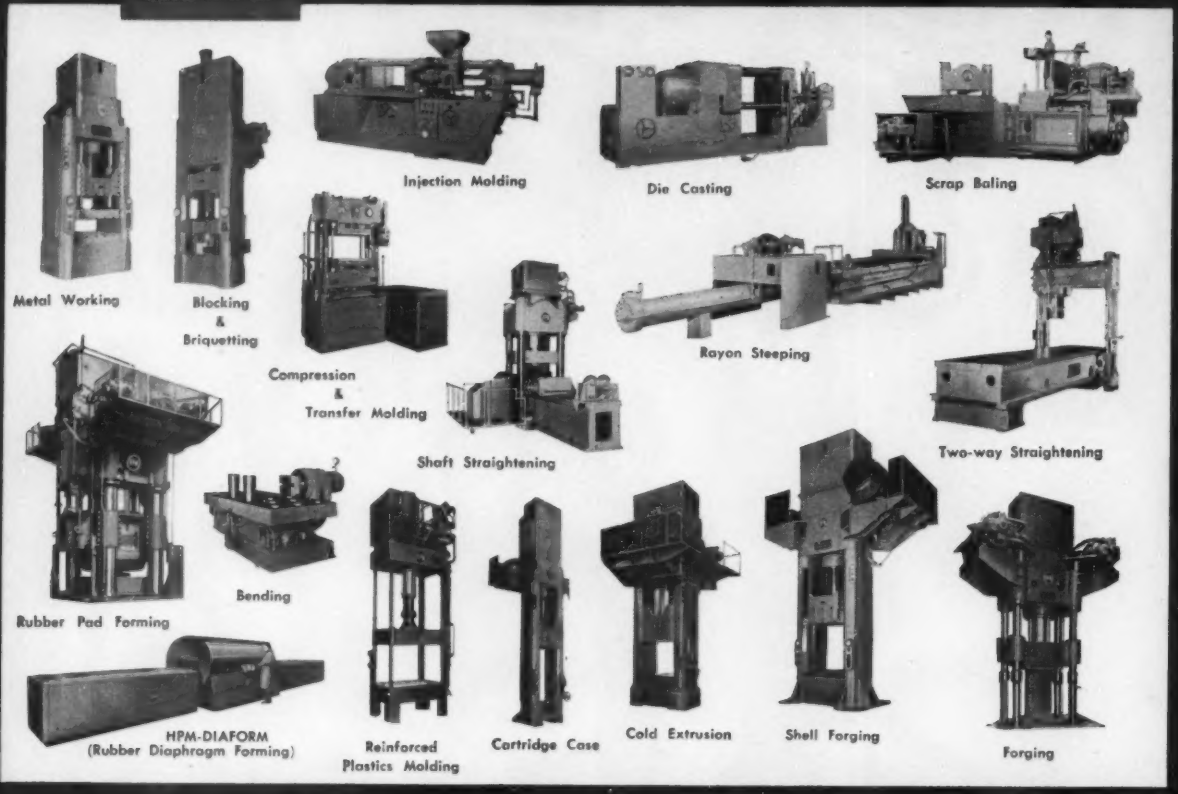

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PITTSBURGH 22, PA.

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BIRMINGHAM 3, ALABAMA
Quinn, McKerall & Quinn
CAMBRIDGE 42, MASS.
Austin Hastings Co., Inc.
DALLAS, TEXAS
Tri-State Machinery Co.
DENVER, COLORADO
The Mine & Smelter Supply Co.
HOUSTON 2, TEXAS
The H. L. Thompson Co.
KANSAS CITY, MISSOURI
Blackman & Nuetzel Mach. Co.
LOS ANGELES 11, CALIF.
Machinery Sales Co.
NEW ORLEANS, LOUISIANA
Frederic & Baker
OMAHA 2, NEBRASKA
Fuchs Machinery & Supply Co.
PORTLAND, OREGON
Hallidie Machinery Co., Inc.
RICHMOND 2, VIRGINIA
Smith-Courtney Company
SAINT LOUIS 8, MISSOURI
Blackman & Nuetzel Mach. Co.
SALT LAKE CITY, UTAH
The Mine & Smelter Supply Co.
SAN FRANCISCO 3, CALIF.
B-H-S Machinery Sales Co.
SEATTLE 4, WASHINGTON
Hallidie Machinery Co., Inc.
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Blackman & Nuetzel Mach. Co.
WASHINGTON, D. C.
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F. F. Barber Machinery Div.
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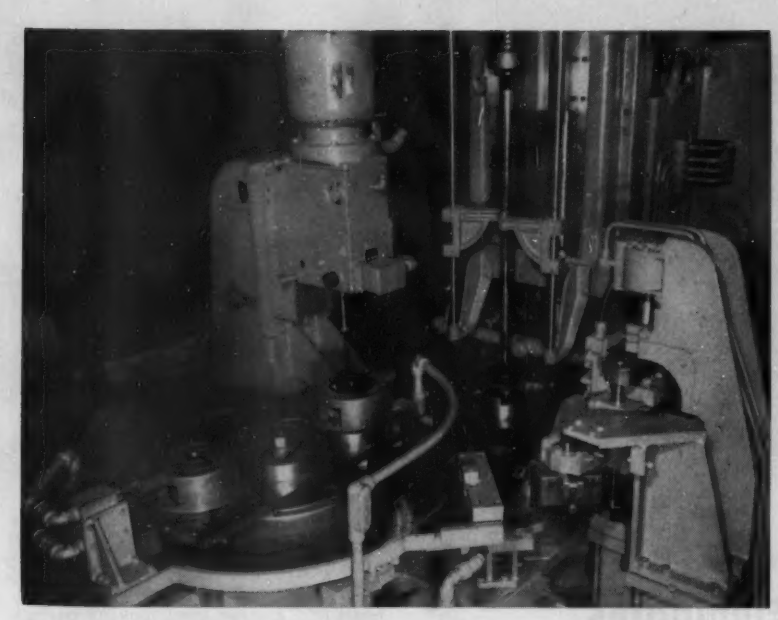
EXPORT DEPARTMENT

MOUNT GILEAD, OHIO
The Hydraulic Press Mfg. Co.
CABLE ADDRESS: "HYDRAULIC"

THE HYDRAULIC PRESS MFG. CO. / MOUNT GILEAD, OHIO, U. S. A.



Drilling, Broaching, and Stamping Combined in Colonial Automated Unit

Automated 3-station machine, developed by Colonial Broach, includes a drill unit, a broaching machine, and a stamping unit. All operations are performed on a single common base in one continuous cycle, and are grouped around the loading and indexing mechanisms.

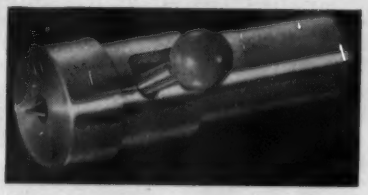
Typical machining cycle on an automotive camshaft sprocket includes: drilling one 0.2656-in.-dia hole in web of sprocket; broaching a 0.1885-0.1905-in. keyway in shaft hole; and stamping the timing mark on sprocket. Included in the loading and indexing fixtures are locating guides that maintain all three operations in proper relationship. Broaching is accomplished by a Colonial RD-624 pull-down broaching machine. Special hydraulically actuated unloader deposits completed parts onto a conveyor.

Indexing table is located off-center and below the loading table. Parts are loaded (sprockets in this case) six at a time into circular holders on ends of oscillating loading arm. Each holder contains an escape mechanism allowing sprockets to drop one at a time onto indexing table. When the sixth drops, it triggers a switch that swings the arm around to a position where the empty holder is reloaded and holder on opposite end begins discharging parts into the chucks on the index table.

Hydraulically actuated rotating index table contains around the periphery four equally spaced special chucks that receive and locate parts from loading mechanism. Hole in table between adjacent chucks allows broaching tool to be returned following its working stroke; table is indexed every 45°.

In this application, machine performs all operations, plus loading and unloading, on over 200 parts per hour. A 10-hp motor supplies hydraulic power for complete cycle.

Colonial Broach Co, Box 37, Harper Station, Detroit 13



Lathe Tool Combines Stock Stop And Center-Drillholder

Tool for production turret lathe work has been developed to provide accurate and identical center drilling throughout a production run. Identi-Center, a combination rotary stock stop and center-drillholder occupies one hole in the hex turret of the lathe. When measuring off-stock, there is no need to shut off machine, since hardened cap of tool rotates on a ball bearing when it meets stock.

For center drilling it is only necessary to back up the turret about an inch, and shift a lever which brings center drill into position. It is then fed in until rotary cap revolves again, and operation is complete. Diameter of the drill can be measured at face of the stock stop.

Center drill can be easily removed by loosening the handle and one setscrew without taking tool from turret. Depth of center drill cut can be adjusted easily with a screwdriver through open end of the shank.

Shank diameters available are 1, 1¼, 1½, and 1¾ in.

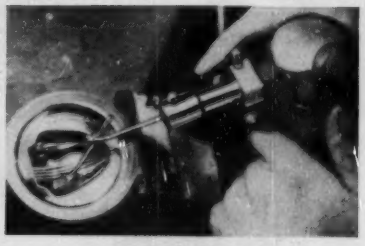
Shultz Mfg Co, 3444 Orange Ave, Dept N-25, Cleveland 15

Indexing Dials Feature Roller Gear Drive

High speed index tables feature the Ferguson roller gear drive. Indexing dials can be incorporated in new machine and adapted to fit existing machinery. Tables are available on custom-design housings or in components of the cam and roller gear drive.

Indexing periods are possible at any portion of the cycle. Any number of stops are possible with standardized roller gear drives existing for four or more stops per revolution. Inherent locking principle in zero backlash of gear drives is said to eliminate the need of auxiliary locating devices.

Roller Gear Div, Ferguson Machine & Tool Co, Box 191, St Louis 21, Mo

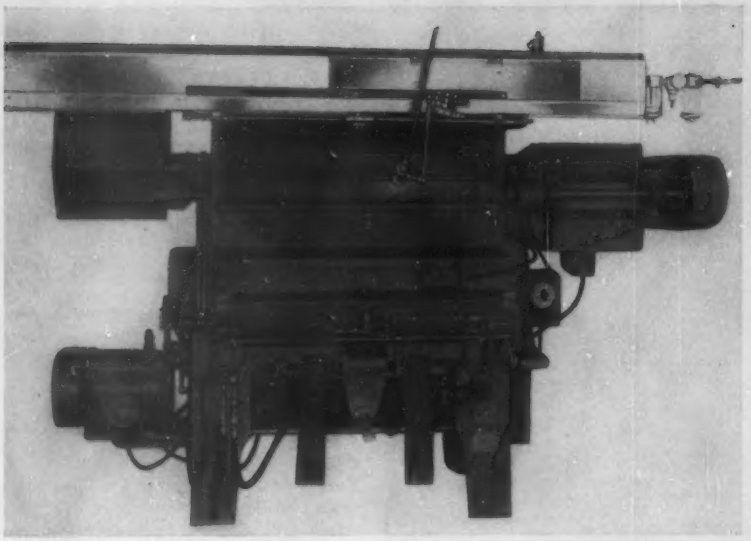


New Di-Profiler and Accessories

Model FNC Di-Profiler can be used with any suitable flexible drive and without an intermediary sleeve coupling. Reciprocating hand machine has been designed for cutting, roughing, and finishing dies, tools, and molds. Weighs less than one pound; speed is adjustable from 0 to 100 strokes per second; controlled stroke variable from 0 to 6mm (¼ in.).

New accessories include rectangular and disk hones and laps already mounted on shoes. Two new angle extension rods permit greater versatility for finishing corners, small areas, grooves, and fine contours.

Engis Equipment Co, 431 S Dearborn St, Chicago 5



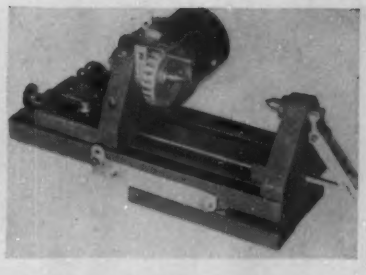
Spray-Gun Device Eliminates Overloading of Sprayed Surfaces

Clair Spray Gun Mover, a hydraulically operated device for applying surface finishing compounds to wide faced buffs, has been designed to operate on any standard surface finishing machine.

Design eliminates overloading of sprayed surfaces and waste of compound; one spray pass is completed each time the operator touches the foot control. Equipment is available in a variety of sizes; the largest permits a coverage of from 2 in. to 40 in. Single gun covers entire width, and a dependable supply of clean, dry, oil-free air is assured at all times.

Basic components include: frame; bearing-mounted carriage; air motor; rack and pinion drive; adjustable, cam-actuated traveling air valve to which spray nozzle is attached; automatic electrical control circuit; and dust-proof enclosure.

Clair Manufacturing Co, 1002 S Union St, Olean, NY

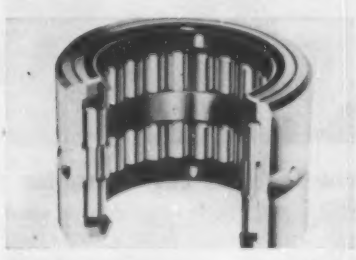


Cylindex Grinder Attachment Powers Cylindrical Work

Attachment can be set up on surface-grinder table and will swing 6 in. and take parts 7¼ in. long between centers. Accuracy to 0.002 in. is claimed with the work held on dead centers. When four-jaw chuck is used, 2-in.-dia stock may be ground.

Attachment has a 1/20-hp, totally enclosed motor, heavily ribbed casting, bronze worm wheel, and hardened and ground steel moving parts. Both ends of spindle turn in anti-friction bearings sealed against dust and dirt. A sine-bar attachment is featured for precision setting, and screw adjustments allow taper grinding up to about 20°. Attachment weighs 23 lb, and costs $297.50.

Binghamton Die & Machine, Inc, 44 Charlotte St, Binghamton, NY



Sealed Bearings At Low Cost

Design of sealed Guiderol bearing provides dirt and lubrication sealing and it costs only a few cents more than unsealed designs, according to the manufacturer. It is made from standard stock parts without additional machining operations and has same cageless construction as standard bearings.

Seal consists of metal stamping with rubber rind bonded to one side —it is located in outer race bore by means of heavy press fit. The rubber rind has an inwardly or outwardly disposed lip which has an interference fit with shaft or inner race OD. This interference fit seals out foreign material and seals in lubricant.

Units are available in both single-sealed and double-sealed design.

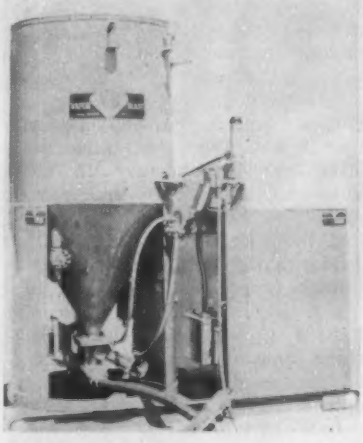
McGill Mfg Co, Inc, Valparaiso, Ind

Adjustable Ball-Bearing Centers

Twin-row ball bearings in MAC multi-action revolving centers have hardened races and spindles that provide 3-point contact to rotate each ball to distribute wear evenly. Centers are said to hold concentricity within a tenth indefinitely.

Adjustable nuts permit changing tension within the center so it will support extra heavy loads. A wide range of sizes and straight or tapered shanks are available. Centers are treated to a minimum of 62 R_c.

Whitfield Mfg Co, 400 Oakland Ave, Washington Courthouse, Ohio



Vapor Blast Unit Runs on Water and Air

Portable wet or dry sandblasting unit, Model B-10-A, is for rust removal, general cleaning, and surface preparation before painting. The unit mounts on steel skids or four-wheel dolly and is easily moved from job to job. Compressed air and running water are necessary for its operation.

Rust inhibitors can be automatically introduced to the blast solution.

Vapor Blast Mfg Co, 3025 West Atkinson Ave, Milwaukee 15

Suntac Cuts Hydraulic Leakage 90%

Hydraulic ram for injection molding press leaked excessively, using ordinary hydraulic oil. Make-up ran approximately 8 gallons per week.

Leaking oil dripped on hot platen and splashed onto operator, causing burns, spotted clothing, and generally untidy condition around the press.

Packings required changing at least once a month—frequent adjusting. Down time for maintenance seriously reduced productivity.

Changed to SUNTAC. Make-up oil now running only about ½ gallon per week. Operators are happier, and productivity greatly increased.

If you have a leaky hydraulic system, remember this: SUNTAC is the hydraulic oil especially compounded to reduce leakage. Special additives make the droplets cling together . . . keep them from leaking through packings. Experience has proved that SUNTAC will cut leakage an average of 35%. Get complete information about SUNTAC Hydraulic Oil from your Sun Oil Co. representative. Or write Dept. AM-10.

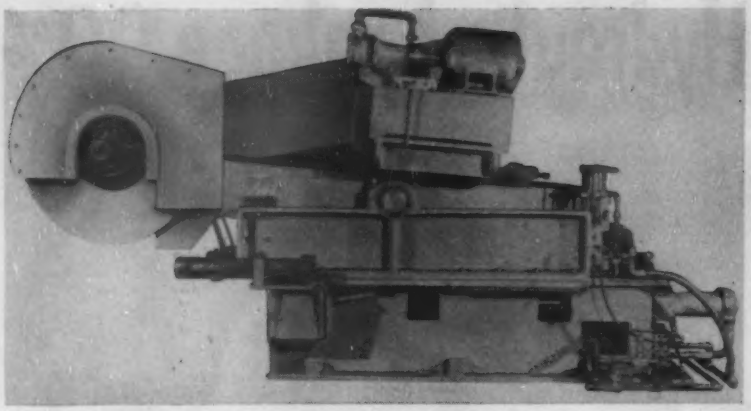
INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

SUNOCO®

PHILADELPHIA 3, PA. • SUN OIL COMPANY LTD., TORONTO & MONTREAL

Refiners of famous High-Test Blue Sunoco Gasoline



Automatic Saw Combines Drop and Crosscut Operation

Automatic 48-in. combination crosscut and drop saw, with either vertical or horizontal blade feed, can cut two 7x7-in. billets side by side.

Developed by York-Gillespie for the steel and other industries, Hot Saw is entirely hydraulically operated, with special feedback controls to provide constant use of maximum horsepower, regardless of varying thickness of material being cut. When used as a crosscut saw, blade lifts out of hot zone and returns to initial position, permitting table to be cleared and product moved quickly into position for further cutting. Peripheral blade speed of this 150-hp unit is over 20,000 fpm.

York-Gillespie Mfg Co, 39th St & Allegheny Valley Railroad, Pittsburgh 1

Hole-Maker Is Versatile Drilling Tool

Steel, cast iron, and softer metals may be bored, cleaned up, and sized with the Hole-Maker, a three-bladed piloted boring tool. Blades are individually adjustable and form a cone inside the cutter body which centers the blades automatically, as long as they are all of the same length.

Depending on clearance angles, cutting speeds, and feeds for a particular job, clean holes may be cut through any thickness of metal, starting against cylindrical, flat, or crowned shapes. Pilot may be removed and replaced with a pilot drill. Two socket-head setscrews clamp each bit and allow setting for a variation of 1 in. in dia being cut. Five sizes ranging from 1 to 6 in. in dia are available.

Robert E Clark Co, Beverly Hills, Calif

Standardized Gage Checks Hole Locations

Model 205 unit satisfies two gaging requirements—(1) location or alignment of hole in workpiece with respect to another hole, surface, or predetermined reference; (2) concentricity of a hole with another finished hole.

Master fixture with precision bore is built that will enable relationship to be established between bore and fixture and hole in part. Single contact gage is located in fixture by locating tube that is precision ground and lapped. Gage can be rotated to check concentricity or moved in and out to check squareness, taper, parallelism, bellmouth, and hourglass condition.

Model 205 gages are frequently used with a precision master fixture, and Federal supplies the design for the master fixture as well as the complete gage.

Twelve basic gages meet most of the requirements in this field. Basic designs can be modified to meet unusual requirements.

Each gage is built to check one single dimension although in larger sizes some contact adjustment is possible. All models are available with indicators graduated to either 0.0005 or 0.0001 in.

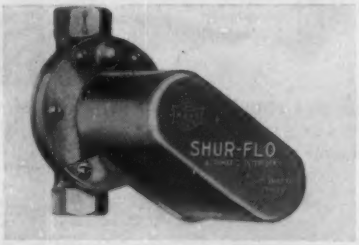
Federal Products Corp, 1144 Eddy St, Providence 1 RI

Long-Life Storage Batteries

Vita-Plate series of long-life storage batteries for use in gas-powered industrial trucks has extra-heavy plates to provide extreme resistance to physical shock, together with a low-gravity electrolyte that insures much longer-than-average life.

Batteries are said to be highly resistant to plate shedding, grid disintegration, and separator failure, and have a low self-discharge rate.

General Communications, Inc, 1420 E 25th St, Cleveland, Ohio



FLOW SWITCH provides automatic interlock operated by differential pressure across orifice. It protects equipment requiring definite flow of fluid to assure proper operation — switch will cut off equipment or provide signal wherever flow falls below established rate. Available in ½ and 1¼-in. pipe sizes. Smaller size provides switch control points anywhere from 0.1 to 8 gpm; larger from 8 to 40 gpm — *Industrial Sales Div, Hays Mfg Co, 812 W 12th St, Erie, Pa*

Vanadium-Alloys Steel Company

first quality* Die Steels for hot work

made with the craftsmanship of lifetime specialization in Tool Steel—exclusively

Hotform The first 5% chromium hot work die steel—still first in strength and toughness combined with high resistance to heat checking. *Uses:* die casting dies, dummy blocks, extrusion dies, backer blocks, mandrels, hot piercers, hot forging dies.

Forge Die Resists softening at elevated temperatures, stays put under impact. 14% tungsten content. *Uses:* forge die inserts, extrusion dies, gripper dies, hot pressing dies, dummy blocks, hot piercing tools.

SC Special 14% tungsten plus increased carbon for higher wear resistance. *Uses:* hot forging dies and punches, extrusion tools, hot forming rolls.

Marvel 10% tungsten for high resistance to high temperatures. *Uses:* brass forging dies, extrusion press tools, nut dies and piercers, hot shears, hot swaging dies.

Hotpress Outstanding tungsten die steel with excellent toughness for work at elevated temperatures. *Uses:* dummy blocks for brass extrusion, press dies, extrusion dies, upsetting dies.

WW Hotwork Highly alloyed for greatest wear resistance at high temperatures. *Uses:* copper and brass extruding dies, brass die casting dies, copper tubing piercers, nozzles for zinc die casting machines.

Red Cut Superior—J Temper

Tungsten High Speed Die Steel, with high hot hardness and wear resistance qualities. *Uses:* hot press dies for copper and brass, extrusion dies, hot and cold trim dies, punches, heading dies.

*guaranteed by deep etch, magnaflux, zyglo, and supersonic testing

VANADIUM-ALLOYS STEEL COMPANY

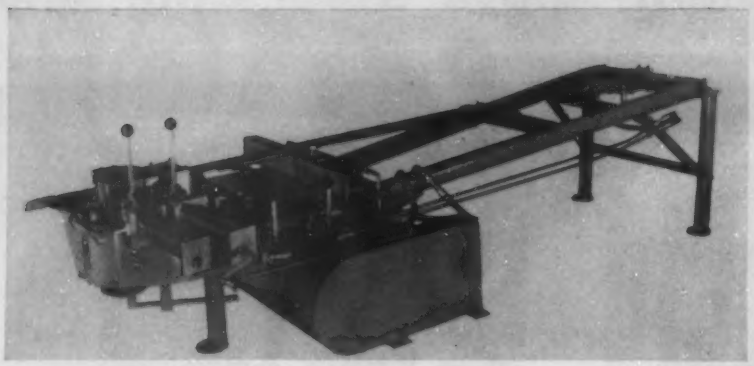
Manufacturers of First Quality Tool and Die Steels

Latrobe, Pennsylvania

COLONIAL STEEL DIVISION • ANCHOR DRAWN STEEL CO.

In Canada:

Vanadium-Alloys Steel Canada Limited, London, Ontario



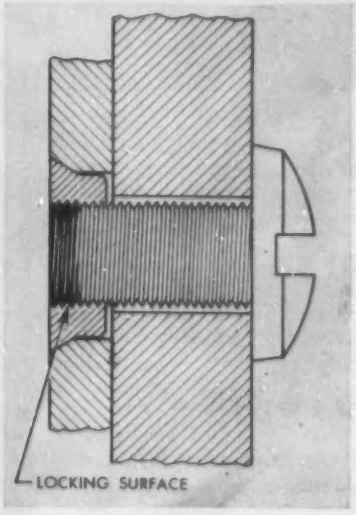
Versatile Rotary Bender Handles 2½-in. Tubing

Self-contained flexible bender, No. 800-2 in., has dual controls, will bend both right- and left-hand, and has clearances for bends on more than one plane. Capacity is 2½-in.-OD x 0.065-in.-wall steel pipe.

Hydraulic power swings the arm through 190°, allowing 10° overtravel for springback on a 180° bend. Unit operates at about 8 rpm and has mandrel clearance of 8 ft 6 in. Maximum radii possible are 10 in. for 2½-in. tube, 14 in. for 1½-in. tube, and 18 in. for 1¼-in. tube. Mandrel movement in and out is controlled by a separate hydraulic valve, and a dial indicating degree of bend is mounted on the head.

Bender has no clutch, brake or reversing motor, but is gear-driven, and shaft is located in ball bearings. Motor pump and hydraulic storage tank are in base of machine. A 5-hp. motor is included.

Wallace Supplies Mfg Co, 1300 Diversey Parkway, Chicago 14

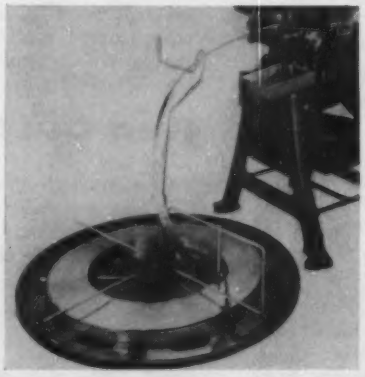


Locknut

Unit is a solid metal piece with a slotted cone shape on one end and splined cylinder on the other, designed to be inserted in countersunk hole. Nut is seated in material and held in position by force-fitted splines. After bolt is inserted locking action is effected by pressure of sector threads forced against bolt by interference of countersinks.

Features include: locking action effected by positive metal interference; unaffected by high temperature; pre-positioning of nut permits blind assembly; requires no wrenching; nut remains in position after bolt is removed; nut threads remain free spinning until bolt is locked; effects flush mount; provides strong threads in members made of softer metals.

Allmetal Screw Products Co, Inc, 821 Stewart Ave, Garden City, LI, NY



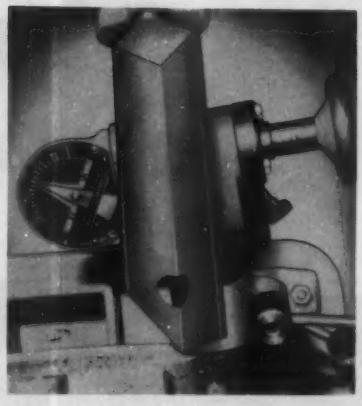
Automatic Stock Reel

New base for 24-in. Jaco automatic stock reel changes angle of feed and allows reel to take full advantage of natural spring of uncoiling stock. Reel is powered entirely by spring of uncoiling stock without use of motors, belts or sprockets—it is fully automatic and needs no attention. It requires no maintenance.

Loop or stock between coil and press feed completely eliminates slippage, kick-back, and over-run. It supplies stock from coil to feed at whatever speed is established by feed. Reel is said to be safe because coil lies flat on platen, and no adjustments or settings are necessary.

Unit is available in three sizes: 24, 30, and 36-in. platen and will operate with any type of coil stock which fits platen and weighs no more than 250 lb.

Jaco Devices, Inc, 90 High St, Hingham, Mass



Clearance-Angle Gage Added to Grinders

Clearance angles are set on drills by an angle indicator which shows 8°, 10°, and 12° clearance. Drill sizes from ⅛ to 2½ in. may be handled. Unit is standard equipment on Model DA and DB sterling grinders.

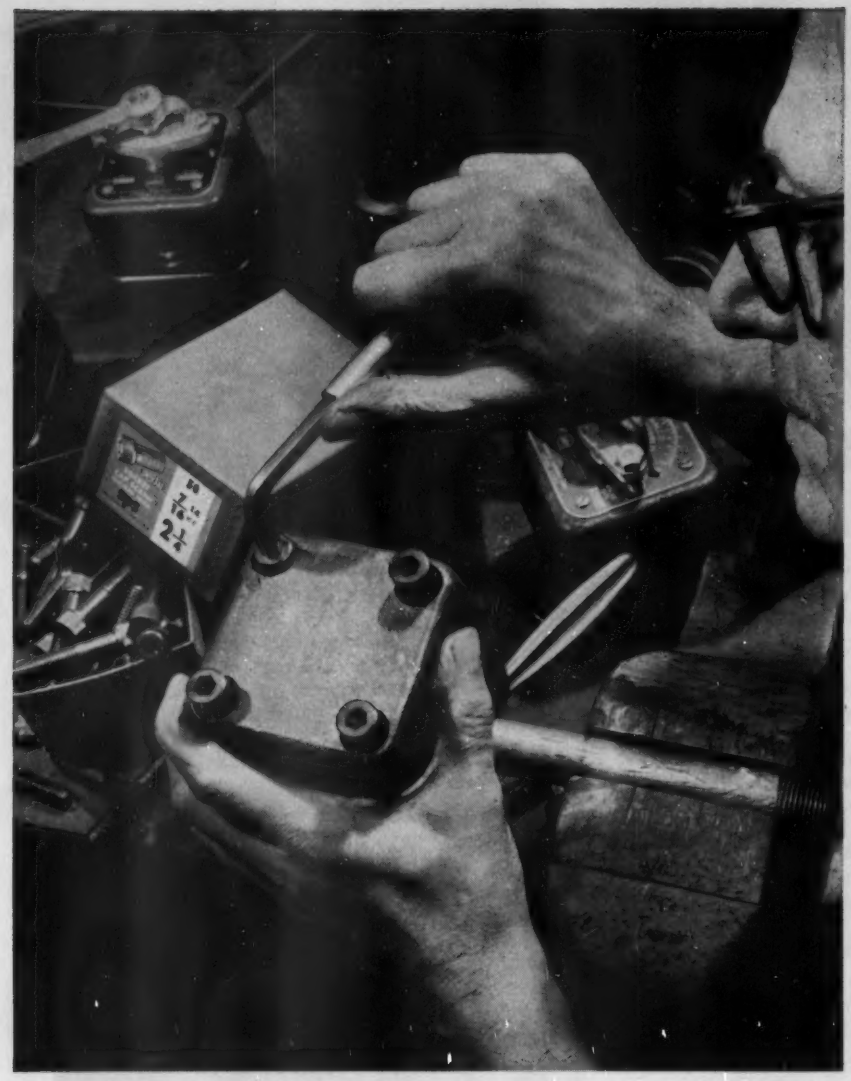
McDonough Mfg Co, Eau Claire, Wis

Hot Stamping Machine

Hot stamping machine is a bench model adjustable lever-operated unit with automatic adjustable roll leaf feed, adjustable stroke, and ample working area for special stamping fixtures. Heat is provided by sealed tubular cartridge heating element.

Work table is cold rolled steel mounted on the cast iron base for overhang where undercut, channel type, or ring-type parts are to be stamped. Opening in back of press permits work to be run through in left to right or backward to forward manner. Type and die holder is provided with interchangeable type chase for use in setting up desired lettering or numbering. Machine designated model E is 14 in. high by 6 in. wide by 13 in. deep.

The Acromark Co, 7-13 Morrell St, Elizabeth, 4, NJ



Four UNBRAKO Socket Head Cap Screws speed assembly in the plant, and reassembly in the field, of these flow-control valves providing 16 different inlet-outlet flow direction combinations.

The knurling on the head of the screw permits faster assembly, because it provides a slip-proof grip.

The uniform depth and size of the hex socket assure maximum torque in wrenching. The accurate diameter of the head permits countersinking.

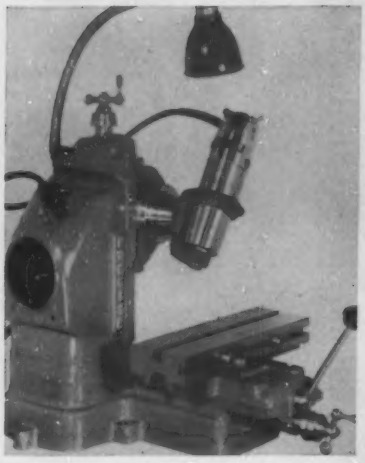
UNBRAKOs—made of heat treated alloy steel—have fully formed threads, Class 3 fit; controlled fillet and continuous grain flow for strength. Supplied in standard sizes from #4 to 1".

Get personalized service, faster delivery with UNBRAKO Standards—stocked by your distributor

When you use UNBRAKO socket screw products, you get the finest socket screws made, *plus* the personalized service and the faster delivery of your local distributor. And he enables you to cut your inventory, set up more space for production. For more information, write for UNBRAKO Standards—a complete listing of precision socket screw products carried by your distributor. STANDARD PRESSED STEEL Co., Jenkintown 1, Pa.

UNBRAKO SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA

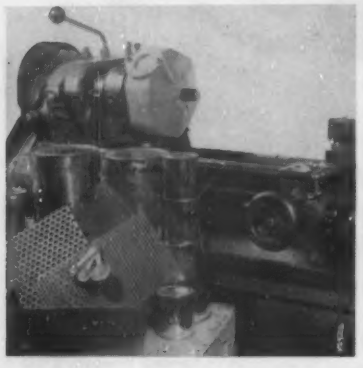


Universal Bench Mill Swivels Head 360°

Quill speeds can be adjusted continuously from 10,000 to 45,000 rpm. Head adjusts through 360° in vertical plane, and arm holding the quill may be tilted 60° above or below the horizontal. Quill and collar chuck are supported on four precision sealed bearings.

Table is 12 in. x 4 in. and has ½-in. T-slot and long dovetail slides with adjustable gib. Hand lever will move table 5 in. longitudinally. Saddle has 3 in. of travel. Included on the 185-lb machine is an adjustable work light. Price is $595. Collets, wheel arbors, and accessories are available.

Precise Products Corp, 1328 Clark St, Racine, Wis



Tumble-Kit Smooths Parts On Back-Geared Engine Lathe

Portable tumbling barrel with 10-in. hexagonal OD and 4-in. width will take 20 lb of parts not exceeding a dimension of 3 in. Barrel is chucked on back-geared lathe and rotated at from 20 to 45 rpm or slower if burrs are heavy. Tailstock support is generally unnecessary.

Barrel is cast aluminum lined with neoprene rubber, weighs 12 lb unloaded, and will work on any back-geared lathe with an 11-in. swing or more. Special outboard bushings will allow it to be used on smaller lathes. Abrasives and tumbling compounds necessary are recommended. Price is $138.

Fiedler Machine & Engineering Co, 430 E 102nd St, New York 29

Ribbed 5-Ton Press Has Double Roller Bearings

Model 5R has 5-ton capacity and speeds from 90 to 285 strokes per minute, and has a 130-lb 18-in.-dia flywheel. Model 4R with 4-ton capacity has a 55-lb flywheel. Optional strokes of 1 in. or 1¼ in. are available on either model. Throat depth is 12¾ in. and shut height is 8½ in. Strokes up to 3 in. are available at extra cost.

Frames are ribbed on both sides for extra strength and rigidity, and are made by the Sobrocast process. These bench models may be fitted with legs at extra cost.

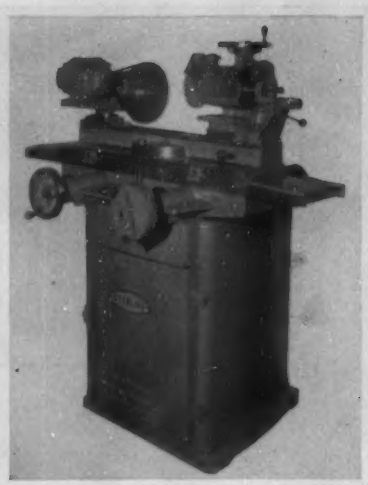
Kenco Mfg Co, 5211 Telegraph Road, Los Angeles 22

Heavy-Duty Air Vise

Vi-Speed Model 1000-6, 6-in. stroke, combination air vise is a heavy-duty unit for conventional holding with 6-in. jaw faces, plus removable pipe jaws located in the lower portion. Hardened pipe or V-jaws are removed for replacement or other types of fixtures.

Jaws open to 11 in.; powered with Vi-Speed 8-in. air cylinder 50:1 ratio on any line pressure to 150 psi. Air stroke is adjustable from 0 to 6 in. Unit is mounted on swivel base.

Van Products Co, 3736 W 12th St, Erie, Pa



Improved Tool Grinder Has Anti-Friction Table

Model G-2 has improvements in the raising and lowering mechanism and the in-feed mechanism, for better accuracy and control, and has relocated controls for operator convenience.

The universal tool and cutter grinder has 10¾-in. swing over the table, 27 in. between centers, and 18-in. table travel. Wheelhead has an Excello motorized spindle rated at 1 hp and 3450 rpm, with permanently sealed lubrication. Wheelhead swivels 180° in either direction.

McDonough Mfg Co, Eau Claire, Wis

Deep-Throat Shear Has 5-ton Capacity

No. 5-24 lever punch and shear has 24-in.-deep throat. It will shear from front to back, or left to right, and will slit sheets of infinite length up to 48 in. wide.

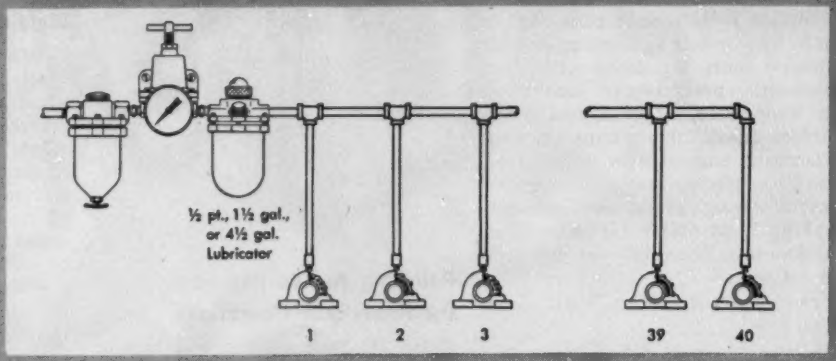
Optional equipment will convert it for punching, shearing, or both, and large selection of punches and dies is available.

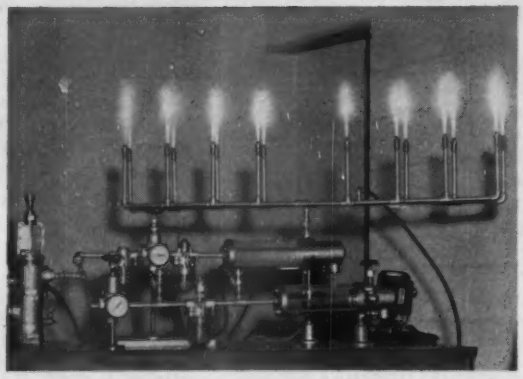
Niagara Machine & Tool Works, 637 Northland Ave, Buffalo 11, NY

tests prove

Norgren micro-fog lubricator

gives absolutely uniform lubrication thru 40 outlets for bearings, spindles, gear boxes





Special multi-outlet testing apparatus in Norgren research laboratory demonstrates uniform distribution of Micro-Fog

Two exclusive features of Norgren Micro-Fog Lubricator—constant oil level and metering of oil feed by an auxiliary air circuit—assure an exactly uniform and accurately regulated rate of oil feed.

Performance data prove that Micro-Fog gives complete lubrication after traveling thru more than 200 ft. of pipe—assures equal distribution of lubricant thru as many as 40 outlets.

WRITE FOR NEW NORGREN BLUEPRINT MF-9

gives complete engineering data on application of Micro-Fog on bearings, gears, chains, etc.

PIONEER AND LEADER IN OIL-FOG LUBRICATION FOR 26 YEARS

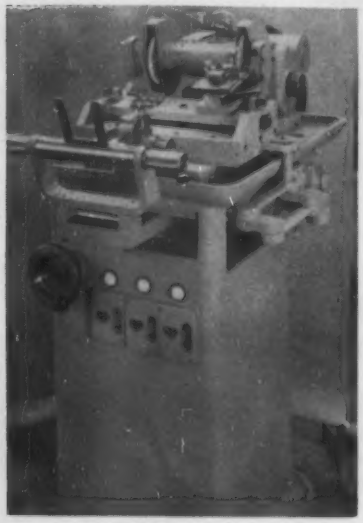
Valves • Filters • Regulators • Lubricators • Hose Assemblies

C. A. Norgren CO.
3436 So. Elati, Englewood, Colo.

Self-Propelled Machine Service Station

Complete maintenance runs can be made by a mobile unit equipped with Alemite units for motor oils, gear lubricants, pressure-gun lubricants, air compressor, air tank, tool trays, surface hoses, and pumps. A 6-hp Wisconsin engine with either rope starter or electric starter powers the unit over rough ground and up slopes making it adaptable for indoor and outdoor use. Three 100-lb drums may be carried.

The Prime-Mover Co, Muscatine, Iowa



Form-Tool Grinder Makes Two Parts

Pantograph mechanism working from a master stylus or templet reproduces two form tools by means of two grinding wheels from the original. There are three stylii in series for roughing, semi-finishing, and ultra-high-precision finishing. Both wheels are diamond-dressed.

Machine will grind a form 1 in. wide and as deep as 11/16 in. Both wheels have 8-in. dia and 1¼-in. arbor holes. A 7/10-hp motor drives the wheels at 2800 rpm normally. When cylindrical grinding is to be done, an attachment will rotate the work at 1450 or 2820 rpm.

The machine is called Copyrex, and is made in Switzerland by F Blasi & Co, Solothurn.

Distributed by High Precision Products Co, Westfield, NJ

Polishing and Buffing Head For Heavy-Duty Operations

Model 52-100 polishing and buffing head and stand unit has a maximum float of 6 in. and can be furnished with power feed for vertical lift or horizontal traverse.

Unit, which can be assembled for either right- or left-hand operation, was designed especially for use with Strait-Line automatic buffing machines. Can also be used with rotary automatics, or as individual polishing and buffing stands similar to polishing and buffing lathes.

Model uses either a 10- or 15-hp, 1750-rpm motor, or a 20-hp, 3500-rpm unit. Net weight of 2500 lb is said to insure vibrationless operation resulting in more uniform finishes.

Hammond Machinery Builders, 1618 Douglas Ave, Kalamazoo, Mich

Measuring Viewer

Indeco pocket comparator, 1½ in. in diameter, with six-power magnifying lens, measures angles, small diameters and radii, and microscopic lengths directly through glass-inscribed reticle. Comparator is placed in contact with part to be measured and dimension is lined up with reticle for immediate, accurate check.

International Development Co, 1 South Reed St, East Riverton, NJ

Bench Model Welding Positioner

Bench-model welding positioner is available with hand or power table tilt. Unit is said to have been engineered to create superior method of positioning work for efficient and economical downhand welding. It is designed with full-range movement of work, with reversible, variable-speed adjustment under full control of welder.

Positioner is equipped with gear-type fluid-drive motor and delivers positive hydraulic power at efficiency approximating 80%. Infinite range of speeds is provided through one simple control with extra-low creeping speed. Work up to 100 lb is handled by positioner, which has 135° of vertical tilt, is self-locking at any angle, and has table rotation at any required speed. Unit is made from standard, easily replaceable parts.

American Equipment Co, Dept 13, 7 Albion St, Paterson, NJ

Angle Drive for Small-Diameter Extension Drilling

Angle drive for small-diameter extension drilling and reaming, developed to eliminate high-cost angle driving units and flexible shafts, is constructed for use with the 500 Series extension rods and chucks.

Angle drive is quickly installed between the drill extension rod and any of 79 standard-size drill extension chucks of Little Beaver line, which eliminate expense of special length drills and fit ¼-in. chucks.

Beaver extension chucks, all of which fit same threaded 8½-in. drill extension rod and feature anti-slip design, correspond to standard drill sizes.

Beaver Tool Co, 622 E Jericho Tpke, Huntington Sta, NY

Webber PRESENTS

The New, All-Purpose, Heavy-Duty 84 Block Gage Set

A COMPLETE GAGING SYSTEM

Here, in a single package, are the 84 gage blocks and the accessories required to constitute a complete gaging system. It will fully meet the exacting requirements of the vast majority of manufacturers of precision products.

Webber Heavy Duty gage blocks are generously proportioned (½" x 1½") in order to insure maximum resistance to wear, with resultant long life. In addition to their normal gaging function, the blocks, used with the proper fixtures, (included in the set) will assemble into dividers, scribers, height or snap gages, thus making them especially valuable for layout or inspection work. When assembled with the required number of six inch blocks, any desired length can be obtained.

84 Block H.D. Set—accuracy, ±.000004", complete with accessories. As illustrated $575.00

84 Block H.D. Set—accuracy, ±.000004", without accessories, with case $495.00

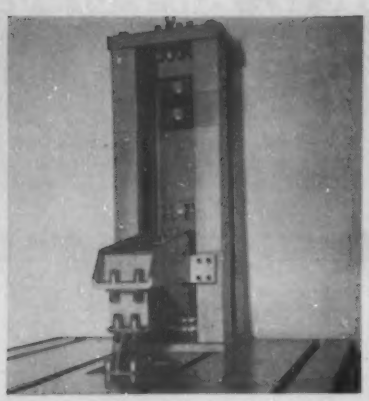
6.000" Block with eccentric clamp $35.75

Webber GAGE COMPANY

12901 Triskett Road • Cleveland 11, Ohio

Webber MICRO-ACCURATE Gages

Largest Exclusive Manufacturers of Precision Gage Blocks



Fatigue Tests on Sonntag Multiplying Fixture

Fatigue tests under loads up to 50,000 lb on a 10,000-lb capacity fatigue machine are provided by Sonntag 5:1 multiplying fixture. It is specially suited for testing flat materials as well as joints that are riveted, welded, or bonded. With proper adapters, round specimens, chains, belts, and other parts can be tested. Maximum deflection of specimens is ±0.050 in.

Fixture has 17¼-in. vertical space between top and loading member and upper fixed platen; lateral space between columns is 9 in. Flexplate acts as fixed pivot of 30-in. lever vibrated vertically by oscillator of fatigue machine. Specimen is loaded through another flexplate 6 in. from fixed pivot. Loading member is guided to move vertically by horizontal flexplates which prevent bending of specimen.

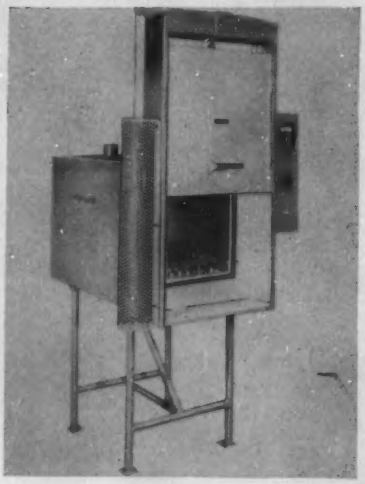
Baldwin-Lima-Hamilton Corp, Philadelphia 42, Pa

Infinitely-Variable-Speed Headstock

Model HS16V, 16,000-lb-capacity infinitely-variable-speed headstock has table-rotation speed range from 0 to 0.57 rpm controlled by micrometer dial indicator with 37 major graduations and 10 micrometer marks per major graduation. Drive is equipped with magnetic braking and all working parts are enclosed within chassis.

Electrical control is by magnetic reversing starter with dust-tight oil-tight remote-pushbutton station operating on low voltage. Headstock is equipped with mercury-grounded main spindle for perfect conduction of welding ground current of any magnitude. Large faceplate table is supported by roller bearing back-up rollers. All bearings are anti-friction and all gears precision-cut, welded steel.

Aronson Machine Co, Arcade, NY



Laboratory Treating Furnace Spans 200-900 F

Electric oven has temperature control within ±6 F, 6-in.-thick magnesia insulation, and positive door seal. Door is spring-loaded and counter-weighted.

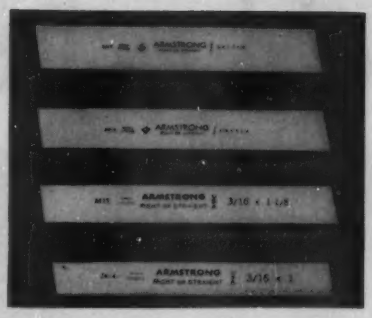
Inside dimensions are 15 x 15 x 26 in. Unit may be powered from 220- or 440-volt, 3-phase power supply. Price of Model 100, Type 1, is $925.

Associated Metal Fabricators, 18-20 Sebago St, Clifton, NJ

Paint Shields

Masking caps, both re-usable and disposable, are available for shielding all sizes and styles of hermetic-seal terminals from paint spray. Paint reportedly will not adhere to tough, plastic cap-masks, said to be practically indestructible, and can be peeled off when dry. Inexpensive disposable masks made of balsa wood withstand re-usage several times.

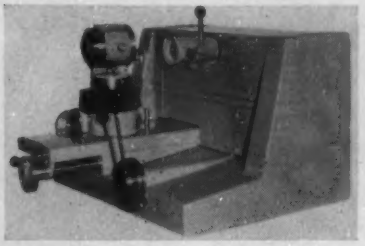
The By-Buk Co, 4314 W Pico Blvd, Los Angeles 19, Calif



HSS Cutoff Blades Ground on Four Sides

Line of Armstrong high-speed-steel cutoff blades have ground top and bottom edges and bevel-ground sides. Available in range of eight sizes from 3/32 x ½ x 4½ in. to ¼ x 1⅜ x 7 in. in two series: one for use in straight and RH offset tools, the other for LH offset tools.

Armstrong Bros Tool Co, Dept R-2, 5200 W Armstrong Ave, Chicago 30



Cylindex Grinder Attachment Moves Wheel, Not Work

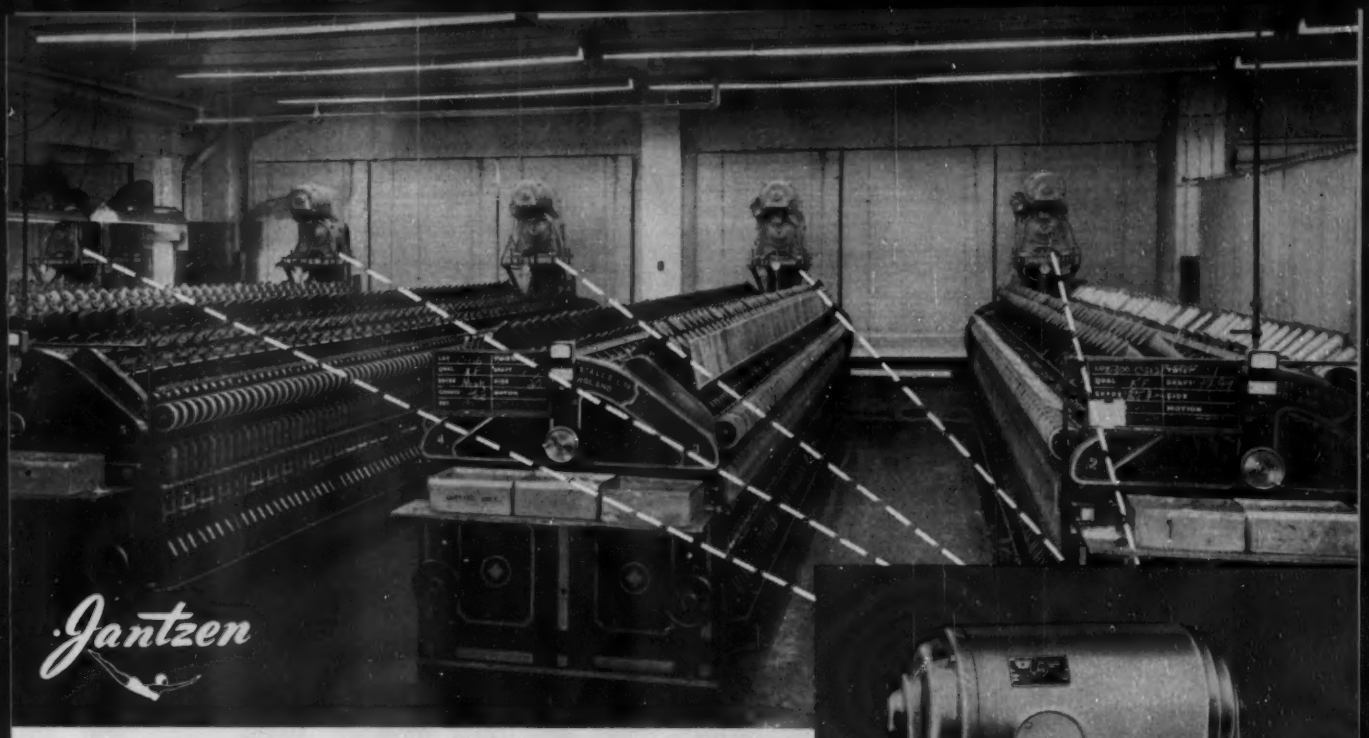
Model RK-2 tool and cutter grinder has workhead centers and universal vise, but no table. Optional equipment includes collet attachment, one cutter-grinding fixture, indexing head, and radius-grinding fixture. Cutters up to 14 in. can be handled; grinding wheel has travel of 10 in. Unit is intended for shops having other equipment for cylindrical, internal, and surface grinding. Wheel spindle floats on anti-friction totally enclosed bearings.

McDonough Mfg Co, Eau Claire, Wis

Nameplates

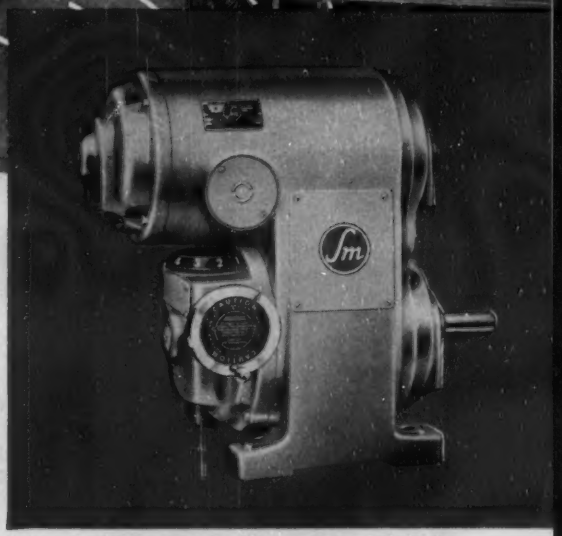
Park Thinplates are nameplates made of 0.003-in. or 0.005-in.-thick anodized aluminum backed by a pressure-sensitive adhesive. Available in anodized colors, they reportedly will not tarnish or oxidize and are highly resistant to abrasion, humidity, and salt spray. Can be serial-numbered in any typewriter.

Park Nameplate Co, 61-07 32nd Ave, Woodside 77, NY



JANTZEN INCREASES PRODUCTION 25% WITH STERLING SPEED-TROLS

We consider Speed-Trol Variable Speed Drives indispensable to the progress of the spinning industry, reports C. A. Fischer, Maintenance Engineer of Jantzen Knitting Mills, Inc. Since installing Speed-Trols on spinning frames and various other machines at Jantzen, production has increased 25% to 30% and maintenance costs have been reduced.



Industry Names Speed-Trol Production Advantages

In a nation-wide user survey of Sterling Speed-Trol Variable Speed Electric Power Drives:

86% Increased Production. **48%** Improved Product Quality. **64%** Reduced Production Costs. **42%** Modernized Equipment and Machines. **20%** Reduced Spoilage and Rejects. **28%** Increased Machine Versatility. **18%** Increased Plant Safety. **34%** Improved Employee Morale. **62%** Lowered Maintenance Costs. **46%** Saved Space. **18%** Simplified Operations. **16%** Synchronized Operations.

Investigate the possibilities of bringing some of these Speed-Trol production advantages to your plant. Sterling Engineering Sales Offices and over 400 Distributors and Service Shops throughout the nation effectively serve every industrial, commercial and agricultural area.

20-PAGE ILLUSTRATED CATALOG ... Sterling Speed-Trol, Slo-Speed, Klosd and Klosd-Tite Electric Power Drives. Write for catalog No. K410.

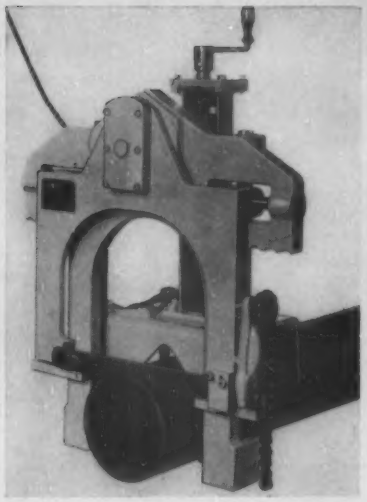
There is a Sterling Electric Power Drive to Meet Virtually Every Requirement

Sterling Slo-Speed Electric Power Drives—for geared low speed at its best
Sterling Klosd and Klosd-Tite Motors—for constant normal speed at its best

STERLING ELECTRIC MOTORS

Plants: New York City 51 • Chicago 35 • Los Angeles 22 • Hamilton, Canada • Santiago, Chile

Offices and distributors in all principal cities

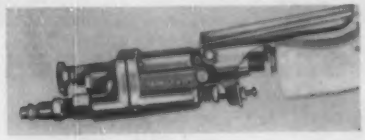


Portable Pipe Saw Has Guillotine Action

Cast iron, steel, pipe, bar stock, and beams from 2 to 8 in. in dia may be cut by a saw weighing 120 lb and operating in a space as narrow as 25 in. wide. Chain-pipe vise clamps saw to work and cast-steel V-saddle base aligns saw perpendicular to the axis of the stock.

Six-inch standard-wall steel pipe can be cut through in 8 min, and 6-in. standard cast-iron pipe in 4 min. The portable machine makes the stock itself act as its base.

E H Wachs Co, 1525 N Dayton St, Chicago 22



Automatic Rivet Timer

Rivet timer enables operator to predetermine precise cycle of hammer blows his rivet gun will deliver, eliminating overdriven rivets and necessity for touch-up of underdriven rivets. Air-timer pneumatically provides precision control by automatically stopping at end of each cycle (trigger release provides for break during cycle, if required); and additionally assures uniformity of rivet height, diameter, and strength.

Unit weighs 11 oz, operates with any air pressure that operates gun. Rigid set controlling required number of blows is provided by set lock on graduated blow-control wheel. Moving parts are safeguarded by built-in air strainer.

New Era Specialties Co, Benton Harbor, Mich

Optical Projector Has 7-in. Screen

Model 67 projector embodies either vertical or horizontal lens systems, or both, in combination with contour or front surface projection. Light sources are contained in heavy cast base to eliminate heat factor. Working table operates on fine-pitch screw for accurate vertical travel. Micrometer measuring stage, graduated in 0.0001 in., attaches to table. Simple selector switch is provided for front-surface, or contour lighting, or both in combination. Standard lenses are available from 10 to 100X.

Stocker & Yale, Inc, Marblehead, Mass

Reciprocating Conveyor

A new type of reciprocating conveyor designed to feed constant volume of any dry or moist material from overhead bin has an operation which is not affected by lumps or variations in consistency of the material. Units of various capacities are available and each conveyor is easily adjustable from maximum capacity to zero. Unit is operated by plant air and the only electric power required is to operate a solenoid air valve.

Hydro-Blast Corporation, 2550 North Western Ave, Chicago 47, Ill

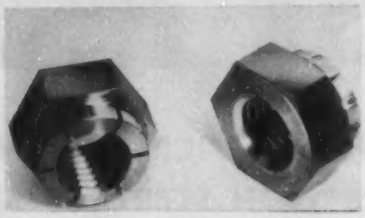
Fast Milling Cutter Has Close Tooth Spacing

Cutting is done against the long side of the solid carbide insert, providing more backup for each blade. With a ¼ x ⅜ x 1½-in. carbide blank, the blade is 225% stronger when the ¼-in. side is the cutting face, and the ⅜-in. side is the relief face. Round body hole is filled by blank and round wedge.

Number of blades for a 2-in. cutter is 8 teeth as illustrated, but number of blades may vary from 2 to 5 times the diameter depending on body size. On a demonstration of a 5-in. shell mill with 10 cutting teeth working on cast semi-steel, the spindle was slowed down until the cutter took a feed per tooth of 0.075 in. without any apparent strain. Normal cut on this kind of job would be about 0.010 in.

Blades are semi-standard carbide rectangles and may be easily obtained for replacement.

Millit, Inc, 55 Flint St, Rochester, NY



Engine Nut

Standard Pressed Steel has added a series of engine nuts to its line of Flexloc self-locking locknuts. Series 32FE is designed for aircraft-, automotive-engine use where temperatures do not exceed 550 F. Nut is distinguished from standard Flexloc by integral metal washer face on seating side of nut. This washer face —a circular collar about 1/32 in. thick—can be machined to much closer tolerances than the full seating face of a standard nut.

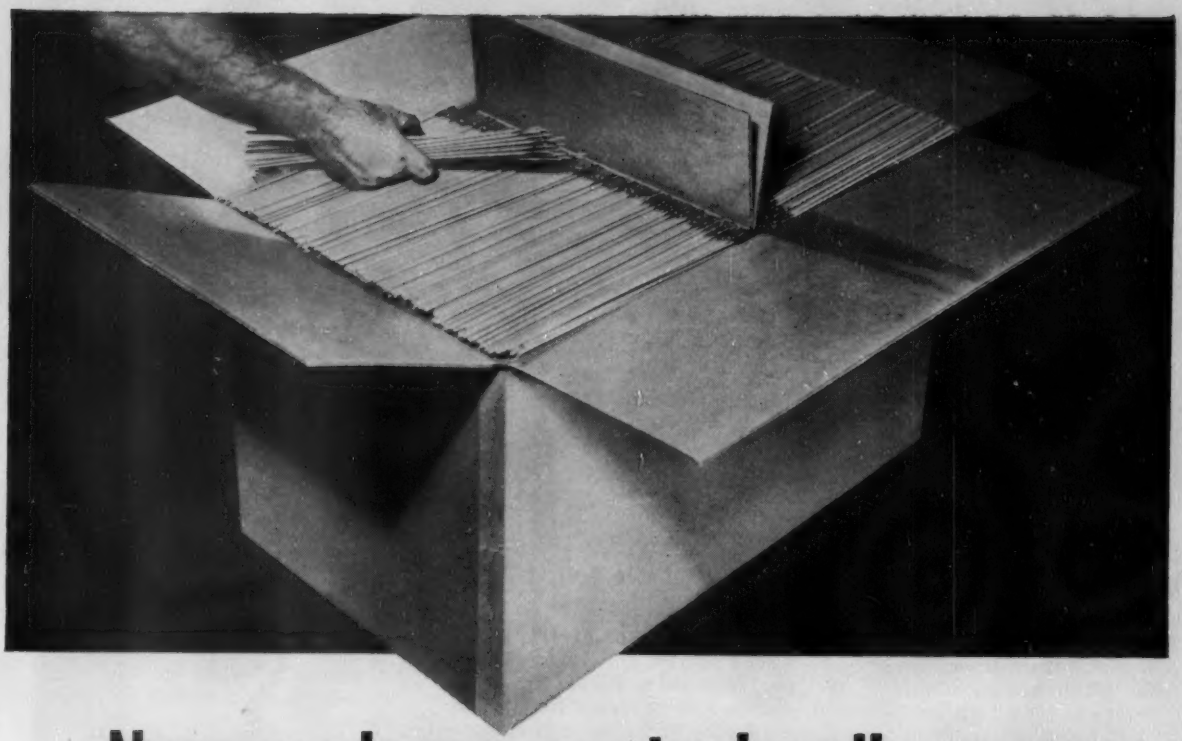
SPS is making its engine-nut series in sizes ranging from 0.190 to 0.500 in. dia. National Fine threads are made to new unified tolerances. Nuts are AMS 5024C alloy steel and are cadmium-plated. The one-piece all-metal units are stop nuts as well as locknuts, locking in any place along bolt or stud whether seated or not.

Standard Pressed Steel Co, Jenkintown, Pa

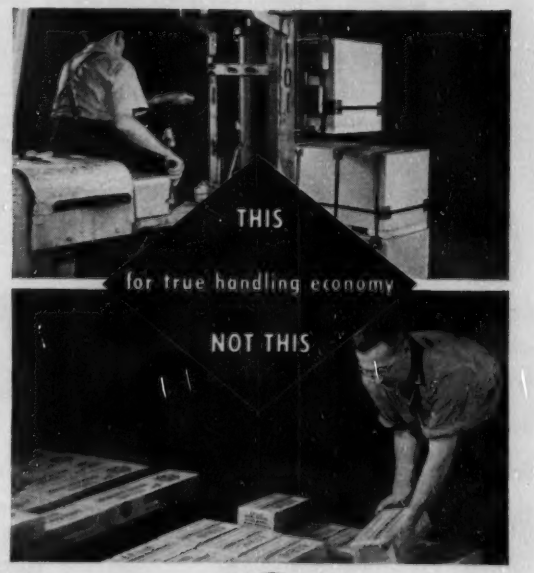
Welding Machine

Welding machine handles pressure vessels up to 120 ft long by 16 ft in dia and weighing 100,000 lb. It is motor powered, works by remote control from front panel. Tank is rotated. Welding machine with two welding heads travels under its own power on a track 120 ft long.

Master Tank and Welding, Dallas, Texas



New modern way to handle your A. O. Smith electrodes



Production-Pak containers work for you 'til the last rod is used

If you use electrodes in *quantity*, this is for you! A. O. Smith's new Production-Pak containers start paying off the moment they hit your plant.

- HANDLING EASE. A single Production-Pak contains approximately 2,000 lbs. of electrodes . . . as many electrodes as you'd get in 40 ordinary boxes. Think of the time and labor saved in unloading alone. Think of the freedom from costly palletizing and de-palletizing.

- STOREKEEPING CONVENIENCE. Production-Pak is its own storage bin. Electrode distribution is faster, easier. No need to break open individual smaller boxes. Just pass out the rods by the handful.

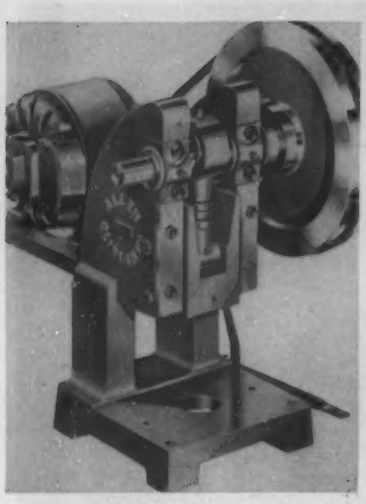
- INVENTORY SIMPLIFIED. Fewer boxes to count. Inventories stay better-balanced . . . because electrodes are easier to dispense on a first-in, first-out basis.

Ask your A. O. Smith distributor about Production-Pak today . . . or write A. O. Smith Corporation, Welding Products Division, Milwaukee 1, Wisconsin.

Through research *. . . a better way*

A.O.Smith
CORPORATION

WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin
INTERNATIONAL DIVISION: MILWAUKEE 1



One-Ton Bench Press Uses Economical Dies

Simple single-pin clutch gives position action and is operated by a convenient hand lever. Press will make 200 strokes per min.

Short-run press tools can be made of cold-rolled stock. Press ram is designed for accurate adjustments and moves on machined ways. A gib provides wear take-up. Press weight is 105 lb, and a ¼ to ½-hp motor is required. Price is $97.50.

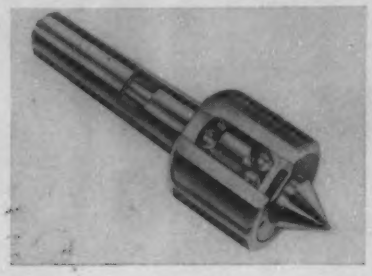
Alva F Allen, 1001 No Third St, Clinton, Mo

Boring Machines Feature Mechanical Automatic Feed

Simplex 2BA mechanical automatic feed precision boring machine is reportedly offered at a low price. Automatic feed unit gives complete automatic cycle which consists of: rapid traverse, feed, dwell, and rapid return. After start button is pressed, cycle is accomplished by means of limit switches. Total length of feed and length of rapid traverse is adjustable by means of trip dogs.

At any time during the cycle, stop button can be pressed to stop machine and emergency return is provided to allow table to be returned at any time. Feed changes are accomplished through feed-change gears and feeds from 1½ to 13½ ipm are available. Reversing feed is available at extra cost.

Simplex Machine Tool Corp, 4548 W Mitchell St, Milwaukee 46, Wis

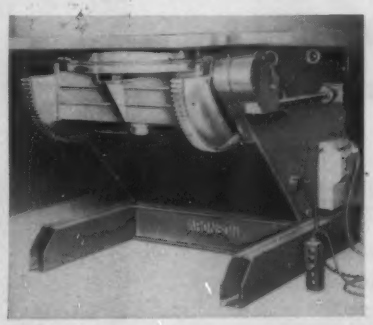


Combination Live Centers In Set of Six

Live center has 6 adapters ranging from a point to a 6¼-in.-dia ball, all packaged in a storage rack. Assembly may be locked for changing, regrinding, or for use as dead center. Centers are hardened and precision ground, featuring duplex radial-thrust-shank bearings, and can be equipped with grease fittings.

Shanks of the adapters can be had in No. 3, 4, and 5 Morse Tapers. Female centers, larger ball centers, and special centers are available.

Rockford Engineered Products Co, 2324 — 23rd Ave, Rockford, Ill

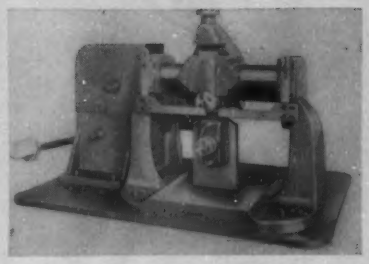


Two Welding Positioners Support 8, 12 Tons

Models HD160 and HD240 gear-driven positioners have totally enclosed table-rotation gears with minimum backlash and magnetic breaking. Tables tilt 135° in 46 sec with full load.

Adjustable table heights range in six steps from 59 to 95 in. Tables are 54x54 in., and can be rotated at any speed from 0 to 0.64 rpm, with rotation torque increased 50% when speed is at or under 0.35 rpm.

Aronson Machine Co, Arcade, NY

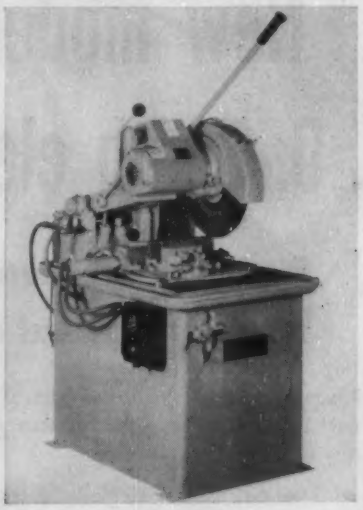


Power Marker Identifies 20 Pieces Per Minute

Large assembled parts as thick as 9 in. may be marked on flat or curved surfaces by Model 99A, which has redesigned frame and entirely new power assembly. Length of stroke is 8 in., and adjustments allow variations of up to 2 in.

Marking is done automatically, while loading and unloading is a manual job except if automatic feeders and ejectors are attached. Control lever is mounted on gearbox at left. Assembly shown is a signal box being marked on the side.

Acromark Co, 7-13 Morrell St, Elizabeth, NJ



Power-Feed Cutting Head

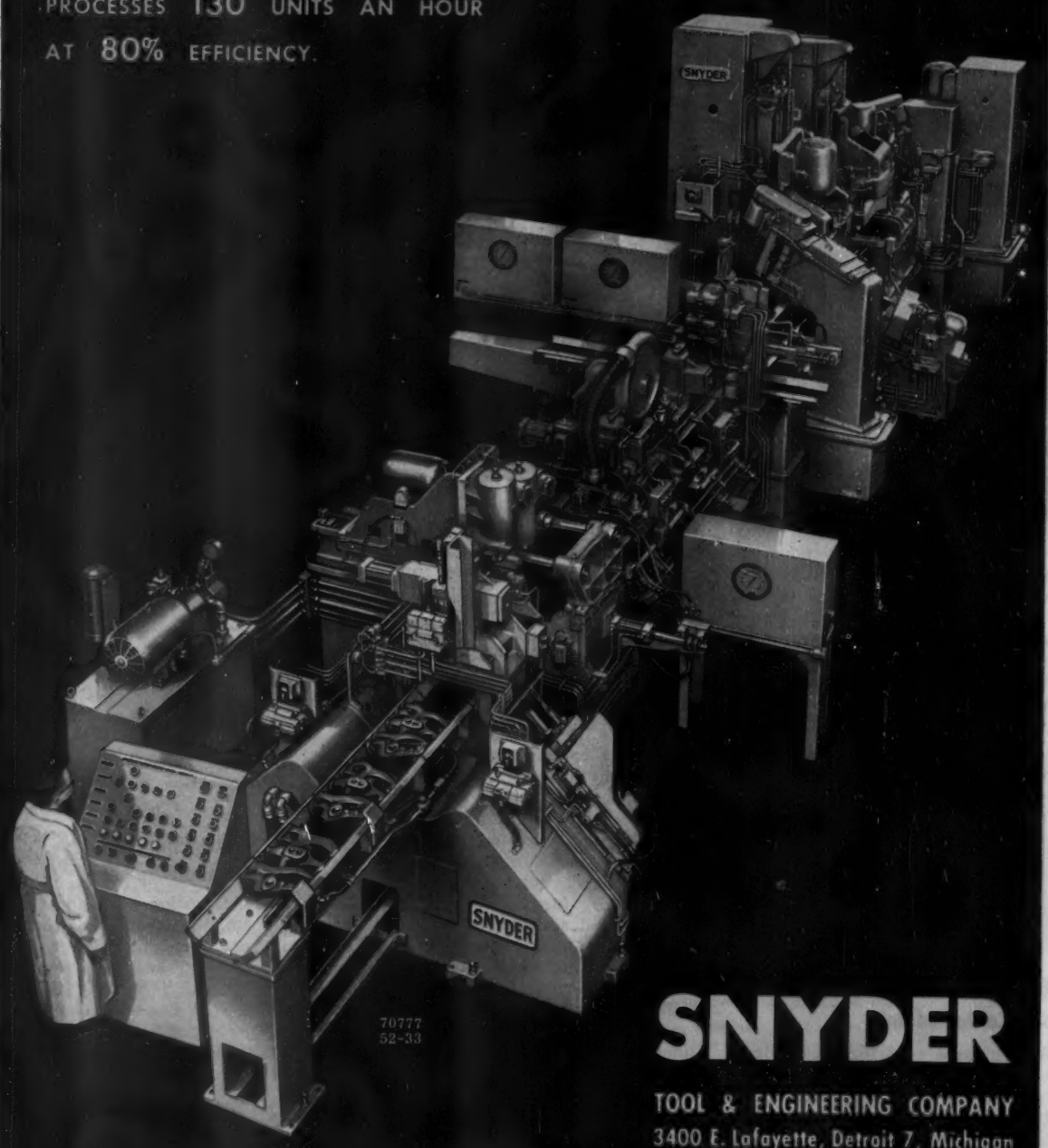
Semi-automatic power feed for the cutting heads of all chopstroke-design Stone saws operates by air with one simple control.

Tests have indicated that the power-feed cutting head will increase production, eliminate operator fatigue, and increase wheel life 10 to 25%, depending on metal cut. It permits a uniform cutting speed of 4 sec per sq in. of metal cut. Attachment is available either as an accessory for present saws, or as optional equipment on all new Stone saws.

Stone Machinery Co, 801 Fayette St, Manlius, NY

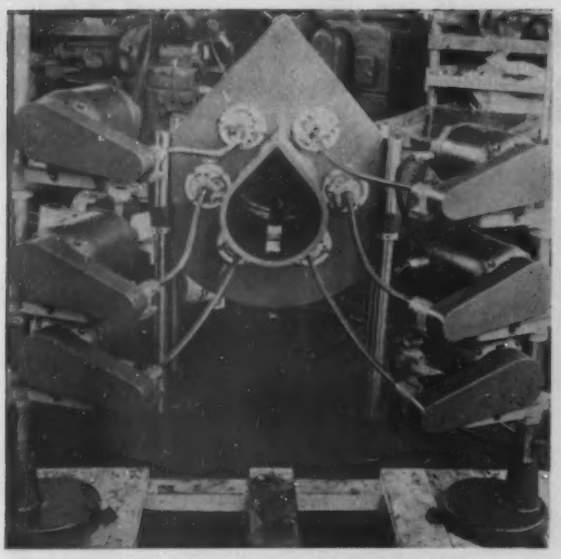
SNYDER SPECIAL 21-STATION AUTOMATIC LINE

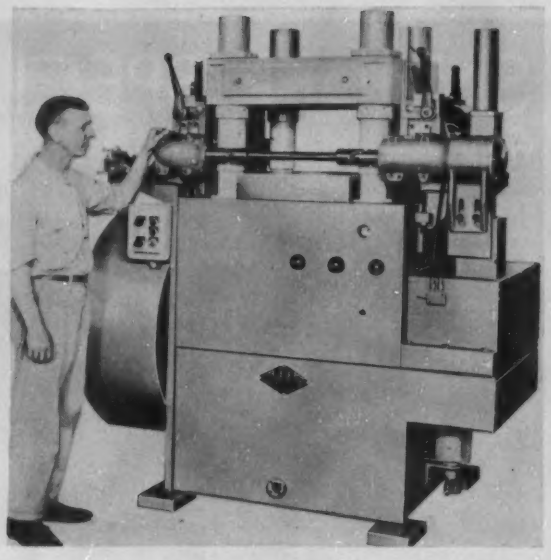
TRANSFER MILLS, DRILLS, CORE-DRILLS, REAMS AND TAPS INTAKE MANIFOLDS; TESTS MANIFOLD FOR AIR LEAKAGE AND VOLUMETRIC AIR FLOW, INSPECTS PROCESSING PROGRESSIVELY, MARKS REJECTS; INSERTS HEATER TUBES; PROCESSES 130 UNITS AN HOUR AT 80% EFFICIENCY.



SNYDER

TOOL & ENGINEERING COMPANY
3400 E. Lafayette, Detroit 7, Michigan
29 Years of Successful Cooperation with Leading American Industries





Centrifugal Spray Painting On Production Line

Spray unit developed by Gyromat is reported to combine economy of operation with high-speed and controllable and consistent coatings. Centrifugal force finely atomizes spray material and directs it to products passing through spray or collecting chamber.

Within collecting chamber atmosphere automatically becomes saturated with solvent of respective material being sprayed. Over-sprayed particles, still at their initial flowable viscosities are collected, drained from the walls, and reused. Tested against automatic air spray, flow-coating, and electro-static air spray installations, the Gyromat units are reported to have shown a minimum material savings ranging up to 50%.

With the known spray pattern, sprayheads are applied to coating problem by positioning and locating proper number of heads. Heads are mounted in collecting chamber which contains overspray and serves as means for mounting sprayheads. Collecting chambers are designed to accommodate conveyor technique employed. It is stated that Gyromat can apply accurately any sprayable material, including paints, lacquers, synthetic enamels, varnishes, ceramics, water-base materials, and emulsions.

Illustrated above is the unit showing hook-up of pumps to sprayheads. Each head is controlled by a separate switch on control board.

Gyromat Corp, Fairfield, Conn

Alpha Production Press Has 75-Ton Capacity

High-speed production press, 75-ton, has maximum length of stroke of 4 in.; maximum speed of 1-in. stroke is 300 per min; 2-in. stroke, 200 per min. By means of air-clutch and brake combination, strokes can be inched, single, or continuous. Clearance between columns right to left is 19 in., front to back 15 in. Other sizes, right to left between columns, are available in multiples of 6 in.

Automatic force-feed lubrication is supplied to all moving parts including roll feed, pull-out rolls, and scrap cutter. All controls are electrical. Point loading of 75 tons can be handled anywhere along centerline of machine. Shut-height adjustment at top of press permits accurate releveling of upper ram in respect to bolster plate.

Alpha Press and Machine, Inc, 9881 Freeland Ave, Detroit 28, Mich

G&L Rotary Table Is Self-Contained Unit

Rotary table reportedly capable of being revolved by flick of a finger has been developed by Giddings & Lewis. Called an Air-Life rotary table, it is a completely self-contained unit with no pieces to assemble or misplace. It contains a collapsible index pin which completely eliminates play in mechanism and compensates for wear which might take place. Plunger can be firmly locked in table and index block every 90° for positive indexing. Graduations are used for positioning between 90° intervals.

Table can be quickly and easily revolved. By turning valve at the base of platen, air is forced into unit, raising table approximately 0.001 in. With air acting as bearing, table floats on air and can be indexed to desired position by turning table by hand. Off-center loads can be easily indexed.

After proper indexing position has been reached and air valve closed, table settles on plain non-lubricated seat. Air escapes from under table on all sides.

Giddings & Lewis Machine Tool Co, Fond du Lac, Wis

Universal Testing Machine Has 75-in. Daylight Opening

Dillon Model L testing machine has daylight opening of 75 in. Will test in tensile, compression, transverse, and shear. Seven capacities are offered: 0 to 250, 500, 1000, 2500, 5000, 7500, and 10,000 lb. The unit is hand-operated or motorized with variable speeds available. Choice can be made of either 5 or 10-in.-dia dial sizes. Mechanism is screw-operated with positive drive, and ball bearings are placed at all strategic points. Unit handles standard round, flat, or special, size specimens.

W C Dillon & Co, Inc, 14620 Keswick St, Van Nuys, Calif

they found $27,000 in a puddle of oil...

It was easy enough to find a puddle of oil in this New England steel plant. 700 gallons of the expensive stuff ended up on the floor every week. It was wasted in the lubrication of massive bearings on their strip rolling mill. Housekeeping problems were terrific.

Then Alemite Oil-Mist was installed on one set of bearings for a test. The results were so immediate—so impressive, that this remarkable system was installed throughout the plant. It eliminated oil waste completely! Saved the 700 gallons of oil that had ended up on the floor every week—a matter of $27,000 a year!

Even more important were the savings effected in labor costs, downtime, and the reduced possibility of bearing failure. A major housekeeping problem and fire hazard was eliminated from the plant. No wonder management is delighted. Delighted, too, with the ease of Oil-Mist installation and the modest cost, repaid by savings in a few short weeks.

Here's the unit that brings these savings to any machine! This is the heart of the Alemite Oil-Mist system. It atomizes oil into tiny, airborne particles that are distributed to bearings through tubing. These particles form a continuous, uniform film of oil that both lubricates and cools the bearing surfaces.

FREE—the complete story of Oil-Mist—how it can bring these savings to any machine in your plant. Specifications, typical installations, case histories.

Three types of fittings allow the use of Alemite Oil-Mist on any bearing—any machine!

1. Oil-Mist fittings bring the most efficient lubrication in the world to roller, ball, needle—or any anti-friction type of bearing.

2. Oil-Mist Spray fittings are recommended for open and enclosed gears and chains. Allows for concentrated application where needed.

3. Oil-Mist Condensing fittings are applied to plain bearings, slides, ways, vees, cams, and rollers. Completely condense Oil-Mist.

ALEMITE

Ask Anyone in Industry

ALEMITE, Division of Stewart-Warner, Dept. C-104
1850 Diversey Parkway, Chicago 14, Illinois

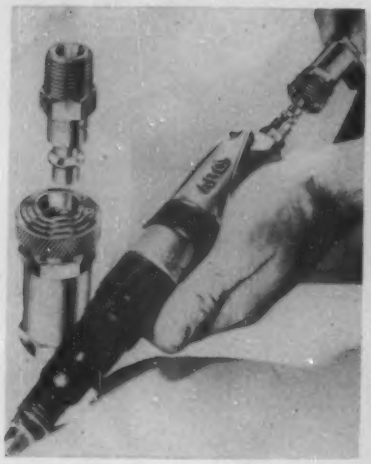
Gentlemen: Please send me complete information on Alemite Oil-Mist. No obligation, of course.

Name_____

Company_____

Address_____

City_____ **Zone**____ **State**_____



Quick-Locking Coupling For Air Systems

Series 1800 coupling incorporates Roylyn quick-lock principle (one-quarter turn) which makes possible split-second interchange of tools. Its positive lock without additional exterior locking devices prevents accidental uncoupling with resulting time loss and danger factor. Coupling assembly is rugged to withstand constant rough service and both coupling and connector are machined from bar steel and cadmium plated. Gasket material is compatible with shop oils and greases. Coupling meets requirements of MIL-C-4109A.

Roylyn Inc, 1706 Standard Ave, Box 3307, Grand Central Station, Glendale 1, California

Optical Comparator Designed For Production Inspection

Model C small-parts comparator has been designed for optical production inspection only. Instrument is reported to combine accuracy, speed, and economy, plus operational comfort.

Features stated by the manufacturer include: horizontal work stage and vertical beam of light permits many parts to be laid flat on stage without holding fixtures; screen and stage are positioned so they are in line with operator's hand and vision; light source is built back into instrument; lenses give erect, unreversed image.

Unit is light enough to be portable. It is equipped with one fixed-magnification lens and a selection of four are available— 20X, 25X, 31¼X and 62½X.

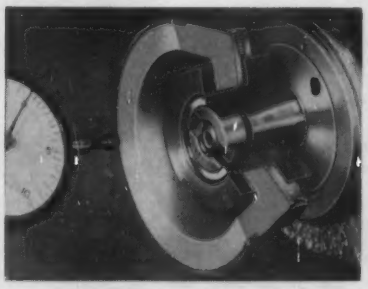
George Scherr Optical Tools Inc, 200 Lafayette St, New York 12, NY

Hand Clamps Cold-Weld Wire

Koldweld Buttweld tools weighing 5 lb, 14 in. long, operate with plier action to join aluminum or copper wire with flanged-welded joints reported stronger than the original wire. KB-14B joins aluminum, copper, or aluminum to copper from 18- to, but not including, 14-gage stock. KB-14 handles 14- to 11-gage material, and will join aluminum or aluminum to copper up to 8 gage.

Price of one unit is $825, including full payment of license from Koldweld Corp of New York to use tools as sold.

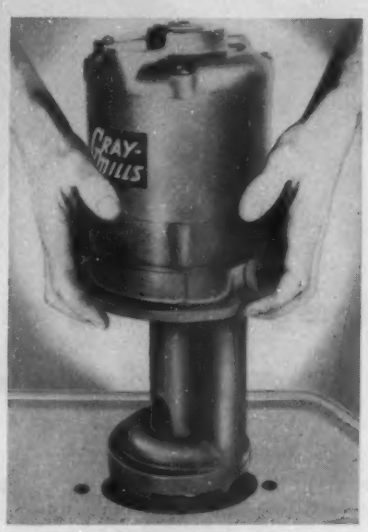
Utica Drop Forge and Tool Corp, Utica 4, NY



Diamond-Wheel Trueing Collar

Easy-Tru collar slips onto grinder spindle behind diamond wheel, locating four cone-point socket screws against spindle shoulder to allow trueing wheel within 0.0005 in. Collar consists of machined body, four screws 90° apart, and safety band around the outside. Trueing operation consists of checking wheel run-out with dial indicator, then tightening or loosening screws to true up front face of diamond wheel. Method eliminates paper shimming.

Queen City Carbide Tool Co, 2338 Gilbert Ave, Cincinnati, Ohio



Minimum Fittings for Machine Coolant Pump

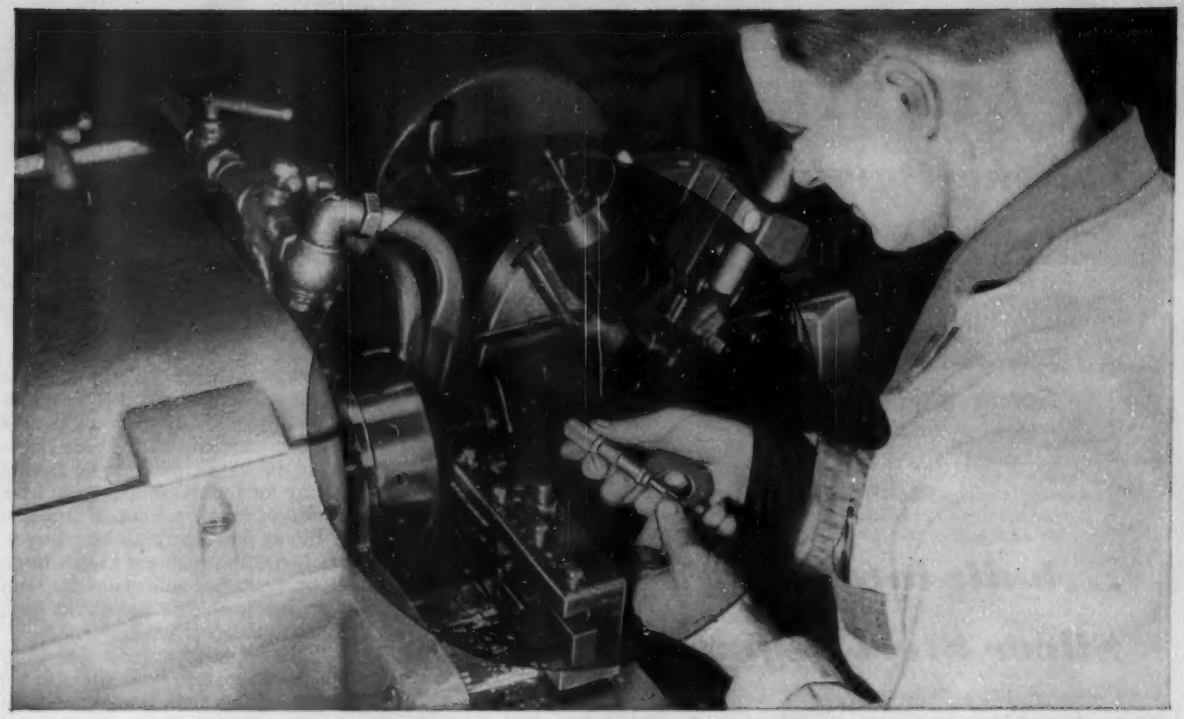
H-6000 is a compact design delivering 17 gpm at a 12-ft head and will handle liquids with a wide range of viscosities, even including abrasives. Complete pump mounts through a hole in the top of a tank or sump and has two alternate immersion lengths; 6½ and 8½ in. Discharge pipe for standard fittings is above self-mounting flange. Compactness is recommended for all machine-tool applications. Pump casting protects all moving parts and shaft, and there is no metal-to-metal contact between moving parts.

Graymills Corp, 3705 N Lincoln Ave, Chicago 13

Washing Solution

Oakite CrysCoat SW is a zinc-phosphate coating material for iron and steel specifically designed for use in pressure-spray washing equipment. The material provides a fine-grained, dense, and uniform coating, lighter than the manufacturer's CrysCoat HC, and is recommended for use in immersion tanks. Special Service Reports available by requesting on company letterhead.

Oakite Products, Inc, 124 Rector St, New York 6, NY



TOOL LIFE INCREASED 40% USING CITIES SERVICE CUTTING OIL

ONE OIL FOR ALL? After poor results with many cutting oils, the Dunbar Machine & Tool Company discovered all their cutting jobs could be done to perfection using only one oil . . . Cities Service Chillo #44.

NO EYE STRAIN. In addition to a 40% increase in tool life, owner Robert Dunbar found that the transparent characteristics of Chillo #44 help eliminate eye strain. Cutting operation is easily visible to operator.

Production Also Up, Reports Dunbar Machine & Tool Co.

THE PROBLEM . . . The Dunbar Machine & Tool Co., Massillon, Ohio, had a problem. It seemed impossible to find one oil which would perform economically and efficiently for ALL the jobs required of the firm's automatic screw machines.

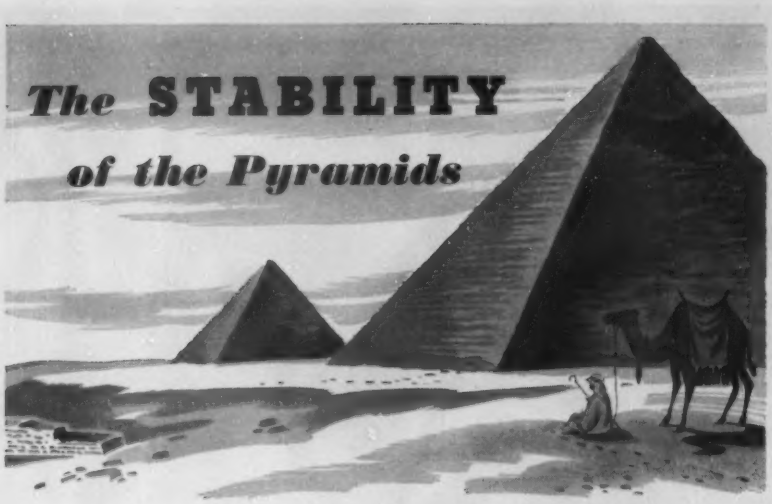
THE SOLUTION . . . After trying many brands of cutting oil, "none of which gave good all-round performance," owner Robert Dunbar called in a Cities Service engineer. After careful analysis of the problem, the engineer recommended Chillo #44 cutting oil.

THE RESULTS . . . Using Chillo #44, the company observed these results: Tool life increased nearly 40% . . . Production increased accordingly . . . Additional savings realized due to chip draining characteristics of oil . . . Holding tolerances no longer any problem . . . Machine clean-up time now insignificant . . . Transparency of oil eliminates eye-strain . . . Less smoke and fumes at high speeds . . . Also excellent for lubricating purposes. Says Mr. Dunbar, "Our results with Chillo #44 permit us to heartily endorse this product."

If you have a cutting oil problem, consult your nearest Cities Service representative or write Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



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Silver Steel Segmental Saw!

You benefit by these design features:

Shockproof Segments are Multi-Riveted!

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- save wear and tear on plates
- prevent distortion of rivet holes
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Segments *Fit Over* The Plate!

- permits *positive* inspection
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Get an Atkins *Silver Steel* Segmental Saw today. Call your Atkins distributor. Prompt service on all shipments and repairs.

NEW! Now Available—Atkins *Silver Steel* precision ground flat stock in all standard sizes!

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ATKINS SAW DIVISION
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ATKINS Silver Steel SAWS
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ROUND TABLE Discussion

PRIMA DONNA

What is the most effective way to handle the "special case" worker who considers himself above performing routine work because he has proven his ability to handle the tough setup jobs?

AL'S PROBLEM with Old Man Stone is not an unusual one and it is rather a tough one to lick, but no matter how good a setup man Stone is, he should not be permitted to sit around waiting for jobs; that is very bad for the rest of the personnel. If it works for Stone, they figure, it should work for others, and soon the shop will be full of specialists who claim they can only do one thing—and the loafing will increase.

Al should have a quiet talk with Stone and explain that there is no longer enough setup work to keep him busy, and that Al has only two alternatives to solve this problem. Either Stone will have to take frequent lay-offs between jobs, or else Al will try to find him some other work to do between setup jobs. Old Man Stone may blowup and threaten to quit, he may actually walk out—but the probabilities are that he will be back in a few days and in a much more reasonable frame of mind. Even if he actually quits, Al will be on the winning side, because there are more reasonable setup men around, or he can train a new man. Either solution would be better than allowing any workman to constantly sit idle waiting for a job.

I remember visiting a small, hustling, malleable iron foundry and, as is usual, was invited to stay and see the "pour." When the metal was ready the pour whistle sounded and to my astonishment the men from the office came hurrying to the furnace, fastening heavy splash aprons on to protect their clothes. I believe almost every man in the plant was there to help make a quick pour while the iron was hot. Later I asked the cashier if he didn't object to leaving his ledger to work in the shop as a pourer a couple of times a day. He explained that when he was hired, several years back, it was with the definite understanding that he, like all the rest from the manager down, would have to help out in the pour, take part in the fire drills, and attend "first aid" in the shop training course. He said he did not in the

least object to the extra work; he had accepted the job with that understanding, and he had lived up to it ever since and was satisfied. He also thought the change and exercise were really good for him.

Then there was the tracer working in the drafting room — a middle aged man who did neat and excellent work and had been employed for nearly a year. He seemed bright, and was a quick tracer, so he might be good material to become a draftsman and later, perhaps, be a designer. I had one of the draftsmen make a rough sketch of a small and rather unimportant machine part and mark just the important dimensions on it. I took this sketch to the tracer and told him we were rather busy and that perhaps he could just lay out this machine part, figure out a few dimensions, let Jack, the draftsman, OK it, and then make the tracing. The part was really very simple and Jack was ready and anxious to help out, but the tracer said no. He said he was a tracer and the making of drawings and figuring things out was someone else's job. All he wanted, he said was the pencil drawing with all dimensions shown, then he would make the tracing and he would make a good tracing for me. That was all true, but when we got a little slack he also found out that his attitude was not as good as his tracing ability, for the draftsmen had no scruples about making the tracings of their work and doing other odd jobs rather than work short time. I do not know what the expert tracer is doing now, but it would be a safe bet to say he is either tracing or loafing at home, for I am sure it would never occur to him to tackle anything else, and simple tracers are not in much demand these days. Most draftsmen now can make clean drawings on translucent paper so prints can be taken direct from the pencil work.

Single line specialists can make

"According to this print Joe . . . we must have missed up somewhere . . ."

BE *Sure* YOUR NEW ENGINE LATHE CAN *Take* IT!

The engine lathe you buy today could be the one you will call upon for 'round-the-clock production. Make sure, before you buy, that the lathe of your choice can take such punishment.

ASK ONE QUESTION!

What is the headstock gear arrangement?

MAKE SURE OF THREE POINTS

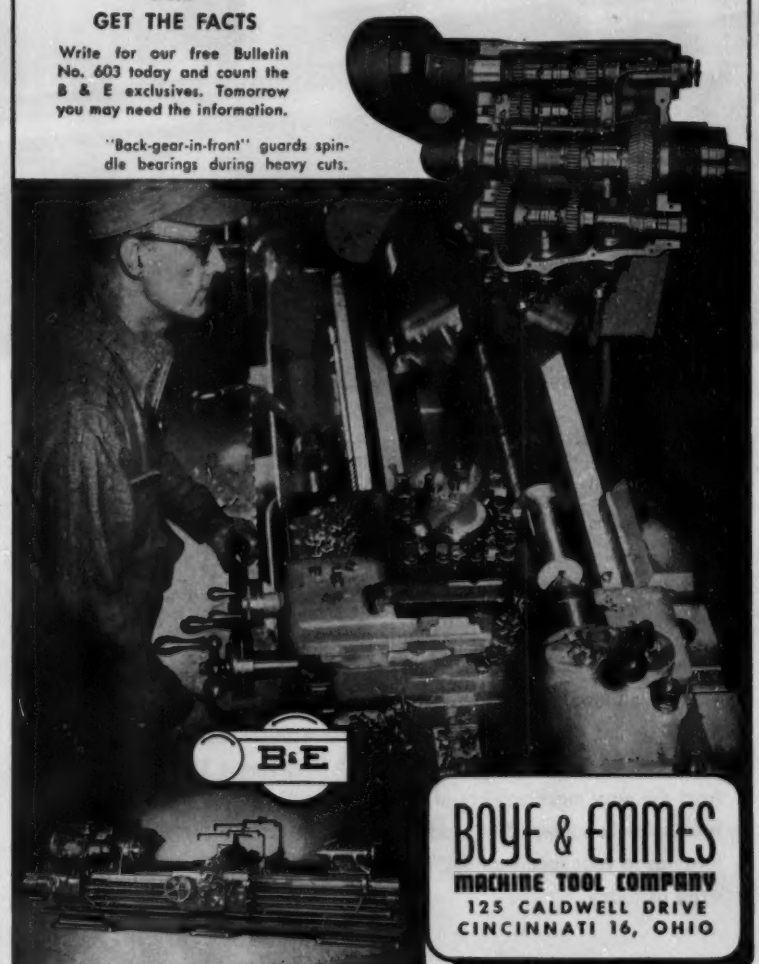
(1) That all gears are arranged in a horizontal plane; easy of access.
(2) That gears are in constant mesh, with speed changes effected by means of sliding jaw clutches; eliminating gear wear due to shifting action.
(3) That the "back gear" is in front of the spindle, exerting its powerful downward thrust to offset the lifting action of the tool when heavy cuts are made.

On these three points long life for engine lathes depends. At these three points Boye & Emmes Long Life, Heavy Duty Engine Lathes excel.

GET THE FACTS

Write for our free Bulletin No. 603 today and count the B & E exclusives. Tomorrow you may need the information.

"Back-gear-in-front" guards spindle bearings during heavy cuts.



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put real sales appeal in your products with MUELLER BRASS CO. forgings

Windows in this modern new Florida hospital supplied by Valley Metal Products Co.—subsidiary, Mueller Brass Co.

The aluminum hardware used on all the windows in this modern hospital is a good example of the sales appeal that can be built into a product with Mueller Brass Co. forgings. These forgings are smart in design, practical in operation, and low in cost. They can also be produced in natural bronze or chrome finish depending on the desires of the architect or builder.

All Mueller Brass Co. forgings have a dense, close-grained structure with a high tensile strength. Weight savings up to 40% are possible in the design of parts because of the close tolerances to which they can be produced. Less scrap and longer tool life result from the easy machinability of forged parts. Mueller Brass Co. is completely equipped to produce brass, bronze or aluminum forgings to your specifications. For complete details, write us today.

MUELLER BRASS CO.

PORT HURON 23, MICHIGAN

good money when business is booming, but it is the more versatile men who still have a full week's work during the business slowdown which, so far, has always arrived after a boom.

Yes, Al had better have a quiet talk with Old Man Stone about the simple facts of machine shop business.

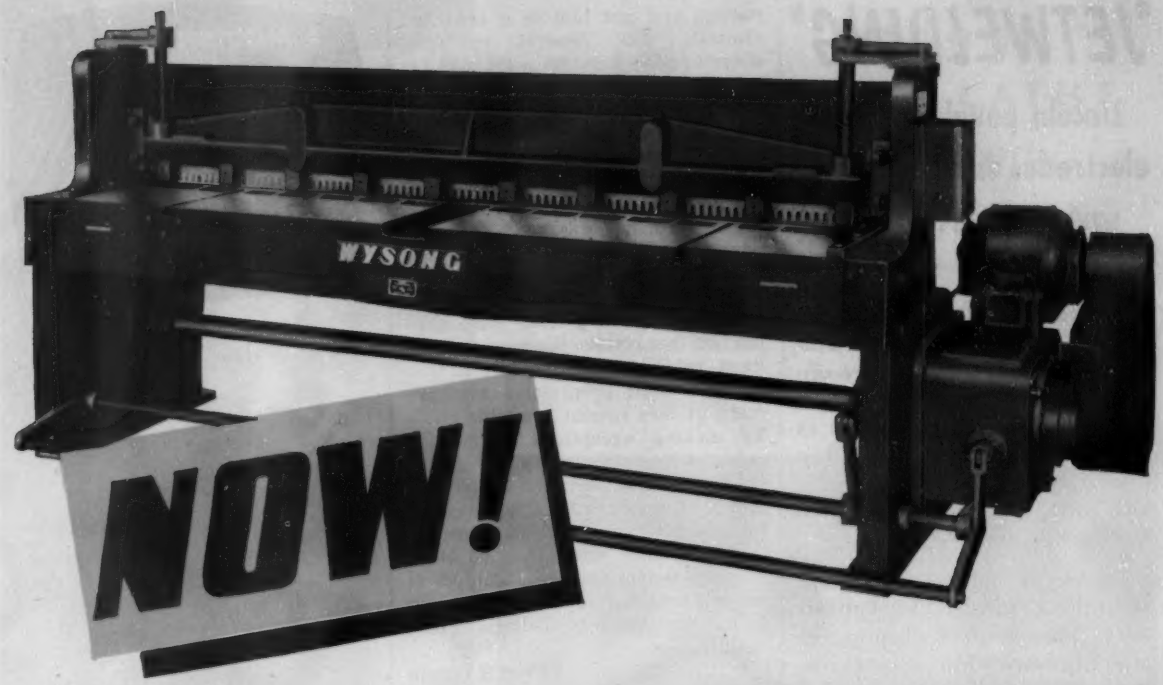
George P Pearce
Albuquerque, NM

NOT ONLY AL, but his company as well, has a real problem in Old Man Stone. But it is not one that necessistates firing him and losing the value of his training and long experience. Part of this at least has been acquired at the expense of the company who should not throw it away because of too rigid rules and regulations. The value of Stone's usefulness will be lost if he leaves the plant.

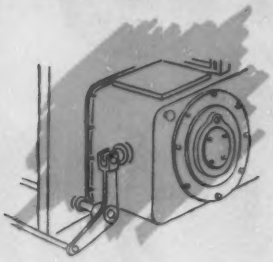
This is one of the cases where hard and fast rules that are perhaps necessary in the majority of cases, should be modified in some reasonable way so as to have his experience on tap when it is needed. Rules are necessary for use in ordinary cases, but when they are made so rigid that the company loses the services of a good man, as in this case, modifications are in order. It is quite probable that had he been made a foreman, as Ed suggested he could have been, he would not have been a success. Being so skillful himself, he might not have been tolerant enough of the average shop man to make a good foreman. For it irks top-notch men to see average performance, and we have to run shops with average men.

If, as Ed says, Stone knows so much about screw machine work, why try to mold him into a foreman or a toolmaker? Why not utilize his ability by having him solve special screw machine problems when they come up in the shop? These are likely to be often enough to make it worth keeping him on tap for consultation, if not for regular working hours. Make him a screw machine specialist, although it might not be advisable to give him any title unless he wants one. He might not like it any better than being a forman. But he is sure to like being known as the man who can solve tough screw machine problems, without any title.

Both Al and Ed make the mistake of trying to fit him into a regular shop schedule. What if he does loaf two days a week, unless they happen to be days when he is really needed? In cases like this it will pay to forget



THE GREATEST SHEAR VALUES EVER OFFERED



Fully Enclosed Drive Unit. Gears Run in Oil.

Straddle Mounted Gears. Longer Gear Life.

9-Jaw Clutch. Positive. Unsurpassed in Performance.

You will be pleasantly surprised to learn how little it costs to own and operate a shear with each of the fine features listed below:

- **Fully Enclosed Drive Unit. Clutch and Gears Run in Oil.**
- **Straddle Mounted Gears. Accurate Meshing. Longer life.**
- **9-Jaw Clutch . . . Quick Acting . . . Trouble Free.**
- **Built-in, Non-Repeat Unit . . . Merely Turn a Knob.**
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- **Self-energizing Brake. No Drag on Down Stroke.**
- **Four-edge Blades, Each a Cutting Edge. Hollow Ground.**
- **Compensating Holddown. Equalized Pressure from end to end.**
- **Metal Finger Guards.**
- **Ball-Bearing, Precision Back Gauge. 1/128th inch setting.**
- **Front and Side Gauges.**
- **Massive, High Tensile Castings. Greater Rigidity. Held Accurate Alignment Far Longer.**

On Every Wysong Power Shear all of these features are **Standard Equipment.** Capacities range from 16 gauge through ¼" mild steel; cutting lengths from 48 inches through 12 feet. For highest production at lowest cost, **"Buy a WYSONG . . . It's MILES Ahead".**

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Builders of Precision Metal Working Machines

Wysong and Miles Company, Greensboro, N. C.

"JETWELDING"

Lincoln powdered iron electrodes introduce new savings in arc welding

THROUGH the use of powdered iron in the electrode coating, Lincoln "Jetweld" utilizes the heat of the arc more efficiently than conventional electrodes. The iron powder is deposited in the weld, permitting higher welding speeds . . . 35% and more, without sacrifice in strength or quality.

"Jetweld" electrodes have smooth, automatic-like appearance. They are self-cleaning to simplify fabrication and cut costly man-hours.

A drag-type electrode, "Jetweld" provides easy operation in flat and near flat position work. "Jetweld 1" (E-6012) is designed for fillet welds. "Jetweld 2" (E-6020) is for deep groove butt welds.

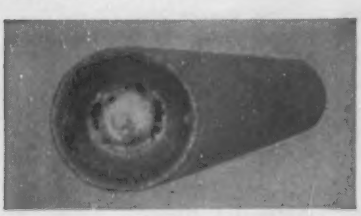


Figure 1. Crucible Action. *End of "Jetweld" electrode forms a crucible . . . maintains right length of arc with simple drag technique.*

Figure 2. X-Ray Quality. *"Jetwelds" are self-cleaning. Appearance is smooth . . . resembles submerged-arc welds.*

GET FACTS. Speeds and procedures for "Jetwelding" are in Lincoln Bulletin 462, Mild Steel Weldirectory. Write to

THE LINCOLN ELECTRIC COMPANY
Dept. 2007, Cleveland 17, Ohio
THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

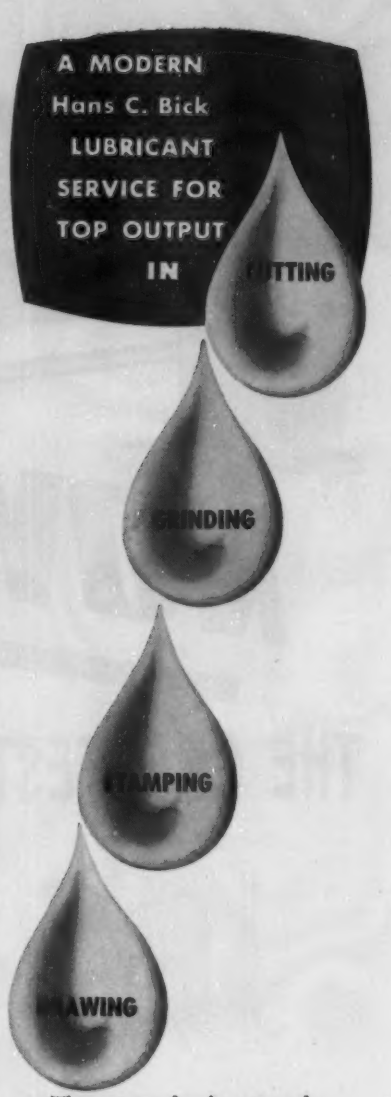
routine and put him in a class by himself. The general manager doesn't follow a routine. He may be most valuable when he seems to be loafing, when in reality he is planning new products or methods that will add to the welfare of the firm.

What if Stone doesn't put in a full week in the way a regular toolmaker does? He may easily save the company more money by special tooling than another man who worked the full week. It is what his long experience does in getting more production that counts. We have to have fixed rules for regular production workers. But progressive management utilizes special available skills by making exceptions to regular rules where necessary. For, in reality, real management is knowing when to break rules that may be necessary in most cases, when special instances come along. A good clerk can see that rules are enforced. It takes a real manager to know when to put them aside to accomplish best results.

Fred H Colvin
Point Pleasant, NJ

MONEY CAN'T BUY the loyalty of an industrial craf sman. In return for his services, the skilled worker wants more than money. He wants job satisfaction. He must be impressed with the importance and the significance of the task he is asked to accomplish. Job satisfaction comes from the opportunity to achieve, to contribute, to create. The worker is not merely earning a living, he is building a life. Man was not made to be a productive machine. He was created to make this world a better place for his having lived in it. The skilled worker wants to make the fullest possible use of his talents. A good foreman sees to it that such men receive the greatest possible satisfaction from their work.

A man who is "hot" on tough jobs, but sneers at ordinary work presents a problem. His foreman has two alternatives. Find enough tough jobs to keep the man busy. If this is impossible, one can stress the importance of ordinary jobs. Add glamor to them. Point out the marvelous laws of scier ce upon which these routine operations depend. Explain the mechanical principles behind the design of the tools and the machines used to perform the operations. Tell the fascinating stories of those who discovered these laws and principles. In modern industry there are sound reasons why management, from an engineering and economic standpoint, considers every job important.



• The top production rates designed into your machines are yours to profit by when you call upon Hans C. Bick for modern lubricants, coolants, and cutting fluids. Manufactured by specialists with 23 years' experience, these compounds are engineered for rigorous conditions such as high feeds, speeds and pressures. Furthermore, you'll like the friendly manner in which our engineers cooperate to solve the toughest problems. To get the most from your machines and tools, always call upon Hans C. Bick to smooth and cool the way.

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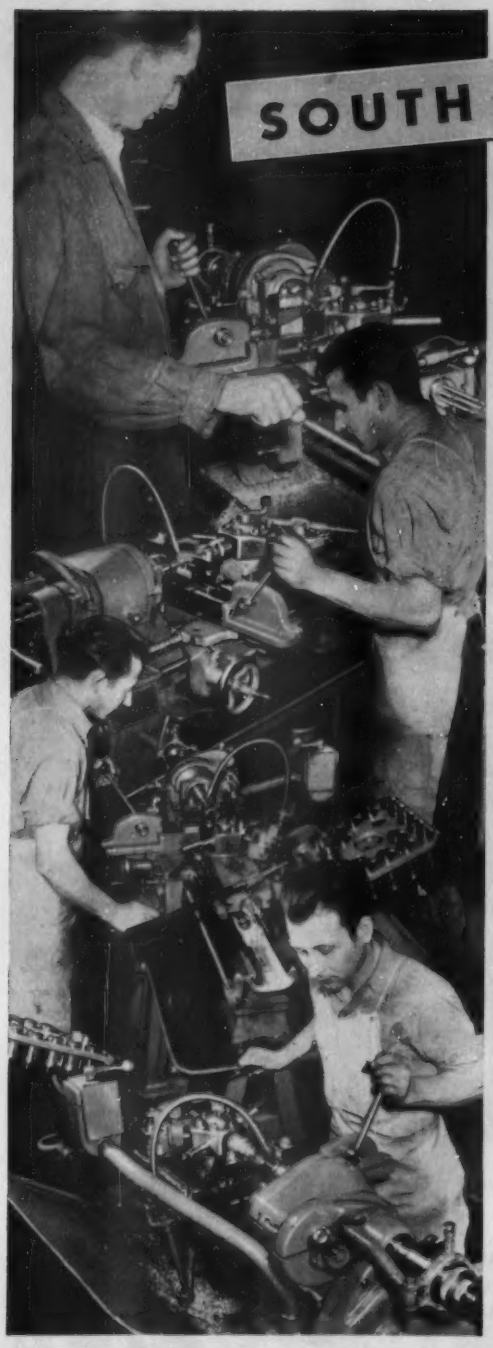
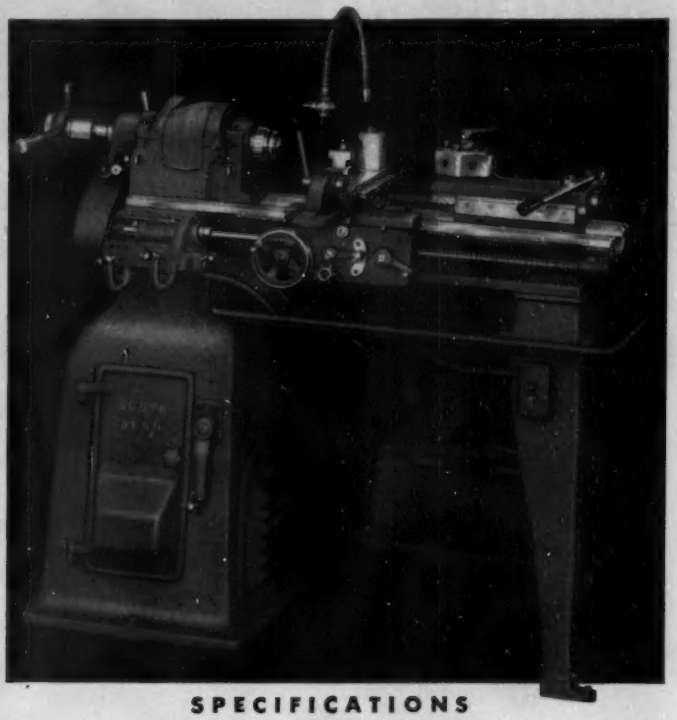


SOUTH BEND 1000 TURRET LATHE

Cost-Cutting Versatility

This precision turret lathe will cut your machining costs on small parts. Built-in accuracy, ease of operation and a wide range of speeds and feeds insure high production and close tolerances. Practical attachments simplify tooling the lathe for jobs which might otherwise require special fixtures. What's more, your least experienced operator will soon be a top producer on the 1000 Turret Lathe — it's that easy to run. Find out how this versatile turret lathe can improve your machining — *send coupon now.*



SPECIFICATIONS

Swing	10-1/8″
Turret to Spindle	19-3/8″
Collet Capacity	1″
Spindle Bore	1-3/8″
Spindle Speeds	12
	50 to 1357 r.p.m.
Power Longitudinal Feeds	70
	.0007″ to .0836″
Power Cross Feeds	70
	.0003″ to .0303″
Thread Cutting Feeds	70
	4 to 480 per inch

$1574.00 f.o.b. factory

CL1006Z illustrated, less motor, controls, draw-in collet chuck, splash pan, coolant pump. Time terms: 10% down, balance 12 or 18 months.

Compared with our costs
OUR PRICES ARE LOWER
than they were back in 1941

Prices are closely tied to costs. Costs are still rising. Buy now before increased costs necessitate higher prices.

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DESIGN ADAPTABILITY: Because of its good fluidity, it can be cast in thin sections and in complicated shapes.

HIGHER STRENGTH: Ultimate strengths range between 60,000 and 90,000 psi; yield strength between 40,000 and 70,000 psi.

EASILY MACHINED: Machinability index (B1112 Steel = 100) ranges between 80 and 90.

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BEARING PROPERTIES: Good non-seizing properties in metal-to-metal contact.

FINE FINISH: Can be given a very smooth finish where desired.

You will find many applications for Pearlitic Malleable castings—particularly as a replacement for forgings, stampings and weldments—where reduced weight, less machining time, fewer assembly operations and better appearance are important production and sales considerations.

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NATIONAL MALLEABLE AND STEEL CASTINGS

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COMPANY

Cleveland 6, Ohio

The Nation's largest independent producer of malleable and pearlitic malleable

A foreman, experienced in handling men, can bring the prima donna around to his way of thinking. He starts by building up the prestige of those doing ordinary work. He expresses the opinion that no one can do the routine jobs as well as the men doing them day in and day out. He wonders how the shop could operate if these men were out for any period of time. The prima donna may take the hint to prove otherwise. If he does, be amazed at the fine job he can do. Perhaps the only time this man receives praise is when he completes a tough job. Since he thrives on praise, give it to him for the successful completion of routine jobs as well as for the successful completion of tough jobs.

A topnotch setup man may have the makings of a good toolmaker, but prefers to remain in the shop. This is another problem. It is like that of a champion soft-ball player who refuses to risk a possible deflation of his ego by playing on a good hardball team. A good setup man may be afraid to stack himself up against experienced toolmakers. This new group of fellow workers will have too many opportunities to make him look foolish. It takes time for a man's class to show in a new field.

Tell this prima donna that you know he will make a first class toolmaker. Explain, with apologies, that if he enters the toolroom he will have to work on the easy jobs at first. It will be months before he can be given a tough job. You are sure that he can do the tough jobs, but the toolroom policy cannot be changed. Thus he will not lose face.

The prima donna will work hard and skillfully when he has a job worthy of his talents; he loafs the

". . . and another thing, we've got to cut down on tooling!"

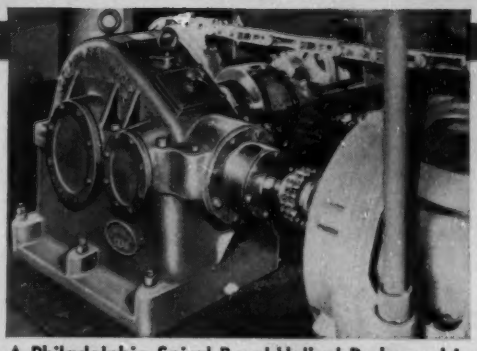
HERE'S

SPEED REDUCER. *Engineering* AT ITS VERY BEST

The sturdy, compact construction of this widely used Philadelphia Spiral Bevel-Helical Unit is evident from an examination of the above illustration . . . the balanced arrangement of the gears; the anti-friction bearings, designed to take combined radial and thrust loads; the rugged pinion and gear shafts which are finished to close tolerances by grinding; the generous sized housing that provides an adequate oil reservoir and large radiating surface for thermal capacity.

Philadelphia Units have built-in satisfaction, and are available in ratios as low as 1 to 1, with horizontal right or left hand output shafts; or Up and Down Vertical Shafts.

Be convinced — send for 58 page Catalog SB-50 which illustrates and describes Philadelphia Spiral Bevel Speed Reducers.



A Philadelphia Spiral Bevel-Helical Reducer driving a Flight Conveyor; 30 hp at 850 rpm; reduction ratio 10 to 1.

PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
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Industrial Gears & Speed Reducers

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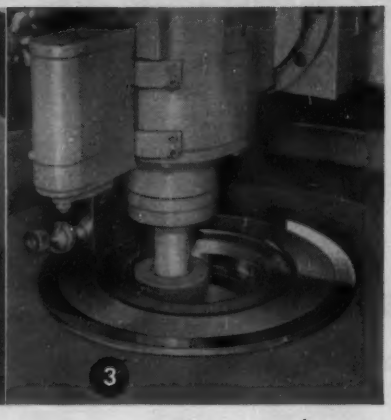
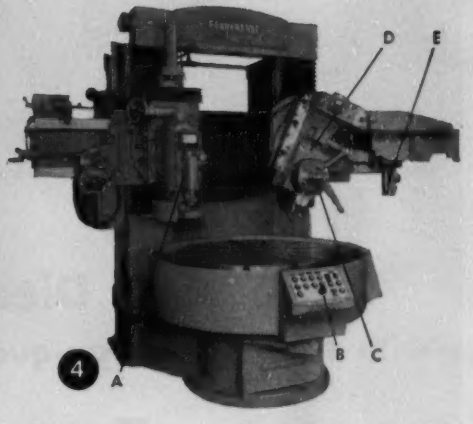
One set-up...

...and you can turn, bore and finish grind a single workpiece to close tolerances on the NEW FRAUENTHAL SERIES 3100 TURNING AND GRINDING MACHINE.

With it, you obtain unusual machining accuracies that assure concentricity of related surfaces.





WITH the new Frauenthal Series 3100 precision turning and grinding machine you get accuracies previously considered impractical.

Designed to meet the most exacting requirements of jet engine manufacture as well as other precision applications, the Series 3100 machine is new from the ground up. Its unique design presents a host of opportunities to put large and extremely close-tolerance jobs on a mass production basis. And the 3100 offers exceptional capacity for precision turning and precision grinding.

Check these salient features

- Ultra-precision work table bearings
- Hydraulically actuated turning slide
- Hydraulically actuated grinding slide
- Super precision grinding spindle
- Conveniently located controls and safety switches

. . . and this optional equipment

- Hydraulic tracer control
- Electronic table surface speed control
- Hydraulic wheel dressers for varied applications

Frauenthal Division

THE KAYDON ENGINEERING CORP.

MUSKEGON, MICHIGAN

...about the pictures

PHOTO 1 shows how the operator uses a Series 3100 machine to finish bore the inside diameters preparatory to grinding operations.

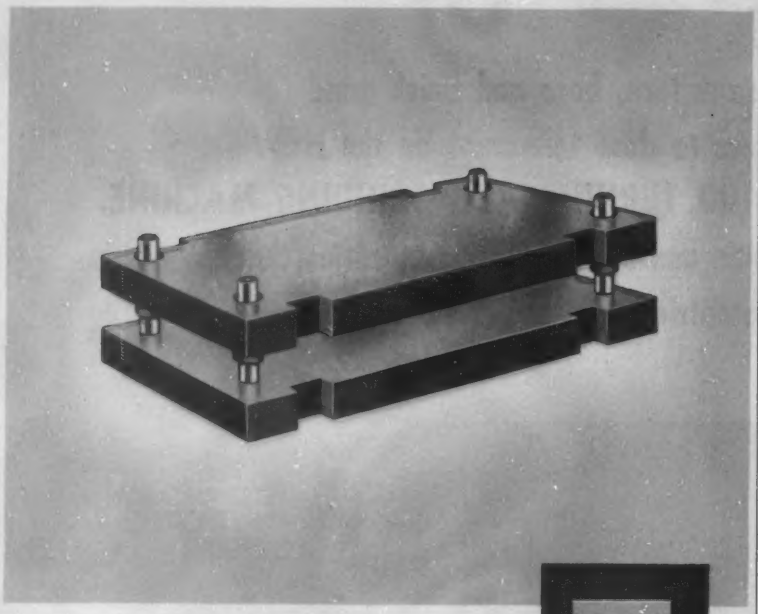
PHOTO 2 shows the machine's contouring attachments being used to face the top surfaces of a workpiece.

PHOTO 3 shows how the machine performs close-tolerance finish grinding of the workpiece's top surfaces and inside diameter, to assure concentricity and squareness of related surfaces.

PHOTO 4 illustrates (a) grinding spindle with graduate swivel mounting, (b) push-button control panel, (c) five-station tool turret, (d) hydraulic actuated turning slide, (e) hydraulic tracer control (optional).

May we help you?

If you'd like further information on how the Series 3100 precision turning and grinding machine can give you production and/or tool room advantages — our engineers are at your service. Write for informative bulletin No. 301.



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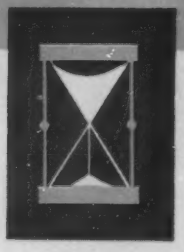

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rest of the time. This is a bad example for the men on routine jobs. It is ruinous to shop discipline. Other jobs are also important. The men so dutiously performing these operations also crave recognition. They, too, have an inner urge to make their lives worthwhile. One cannot cater to one man at the sacrifice of the dignity of his fellow workers.

Accord recognition to the prima donna by your praise whenever possible. But, make sure that there is some justification for it. Be generous. Don't be a flatterer. Praise is sincere, flattery is not.

It is a foreman's duty to provide the greatest possible job satisfaction for his men. The ordinary worker deserves it, the prima donna demands it. Many foremen have acquired this desirable knack. To the others we say, "Start acquiring it today."

Peter A Seward
Swampscott, Mass

•

SUGGESTIONS or EXTRACTIONS?

Should a toolmaker be eligible to participate in a Suggestion Plan, or is it part of his job to produce new ideas and better processes?

EVERY ONCE IN A WHILE, the feasibility of the suggestion plan comes to bat. It is well, because nothing is fully appreciated, or improved unless it is subject to review every so often. I see where our old friends, Ed and Al are at odds over the suggestion plan and so I shall set forth to give my own views on the subject.

First off, I do not agree, as is stated, that toolmakers (of which I am one) have a better imagination than do the rest of the men. It is well known that many people are born with an inherited love for the mechanical arts. Thus we find many of these people working on production lines where simple mechanical operations are performed, and while the amount of skill is very limited, it does serve as a preliminary start toward work requiring more skill. So in due course of time, many of these people become highly-skilled workmen. The ambitious ones may study in their spare time and learn much about the technical side of the business, and they also find the suggestion plan a good outlet for their many ideas as they go along.

Such a plan must of necessity remain a simple one, with a standard rate of payment for accepted ideas, with the exception of ideas upon the improvement of a product made by the firm. Then an extra payment or bonus can be paid only after the

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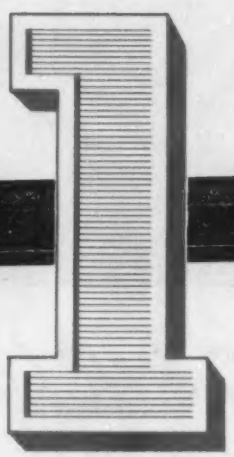
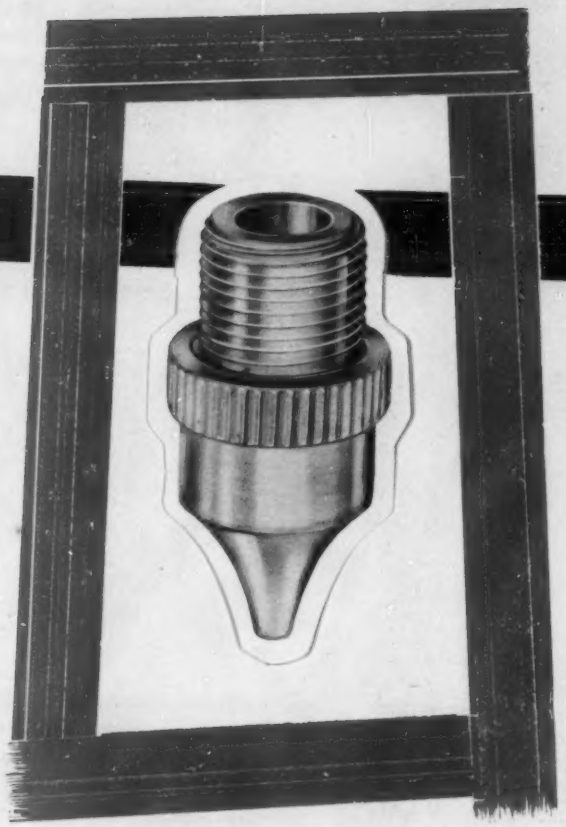
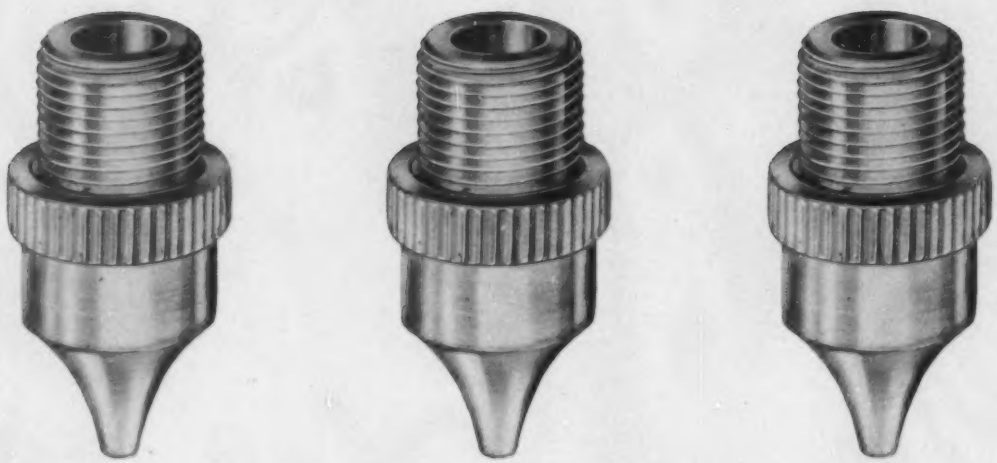




When aluminum gives you 3



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To cut your costs . . . to get better parts—and thus get more jobs—*always bid in aluminum!*

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If you are already machining with aluminum, call a Kaiser Aluminum sales engineer or your nearby Kaiser Aluminum distributor for immediate assistance in obtaining aluminum stock for your specific needs. We believe we are ideally equipped to work with you, because our efforts are put behind the job of serving *manufacturers*—to help improve their products and reduce costs.

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Kaiser Aluminum setting the pace—in growth, quality and service

idea has proved its worth to the firm. Of course the plan is not established with the idea of turning all employees into inventors. Good ideas come about when a sharp mind conceives a better way of making or doing things. Even a salesman who has just come in off the road may drop an idea about something he had seen in successful operation in another town.

There are two very important items which must be used all the time by any wide-awake manufacturing firm that strives to remain at the top. The first is good, matter-of-fact advertising in the right place. Second is the gathering in of new ideas.

Pencoyd Charley
Los Angeles, Calif

ALTHOUGH IT MAY OFTEN be difficult to decide what constitutes each man's ordinary duties, no extra pay should be given anybody for their regular work. And, of course, no foreman should try to penalize any man because he is more skilled in his work or has a better imagination.

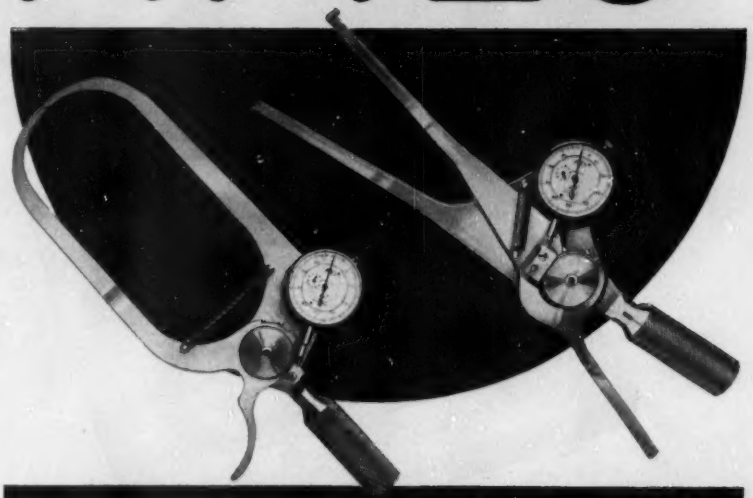
Why should Ed give his boys a hard time about the suggestion plan? What business is that of his? It's up to management to decide what suggestion plan shall be practiced in any shop. Or what power do Ed's toolmakers have to influence him or give him a hard time about this plan? I don't think any. If Ed's toolmakers don't do their duties, the reason is either that Ed is a poor leader or that their wages are too low.

And again, why does Al suspect that Ed is penalizing his toolmakers? If the toolmakers in their shop are not included in the suggestion plan, this plan should be changed so that everybody has a right to participate.

It is surprising how ignorant Ed

"The plant moved while we were on vacation and I can't find out where!"

AMES



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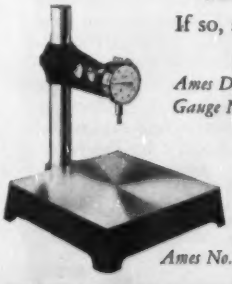

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seems to be about the minds and duties of his toolmakers. Never is it a toolmaker's duty to dream up changed designs, new tools, or methods any more than other guys in the shop. If any man is so inclined that he makes suggestions for his own pleasure, or as contributions to raise his morale or economic standing where he works, he does so of his own free will and not as a demand from his employer, who has no right to force anybody to such activities. If no suggestion plan is in effect, anybody may put suggestions before his foreman, or if this does not give any result, turn them over to the management.

Al's and Ed's discussion reminds me of by-gone days when every toolmaker was supposed to be a wizard on tools and methods. Their statements are, however, behind times. Today both methods and necessary tools are decided upon before the toolmaker's duties are involved. Methods and tools are discussed in the engineering departments of large factories and in the superintendents' offices in small shops; a drawing for each tool is made and a blueprint handed to the toolmaker. If there are any difficulties involved, a foreman, a tool designer, and a toolmaker may have a conference to clear them out. I have taken part in many such conferences.

Ed's claim about the company putting their toolmakers through a long apprenticeship at company expense but unable to collect dividends on their work afterwards is entirely superfluous and does not have anything to do with the suggestion plan. Or was it included as a condition in their apprentice course that they should turn over to the company without renumeration any idea they might conceive for all time to come? That's unreasonable. Some large concerns both in Europe and America

"I had an argument with that weight-lifter over in Dept 9!"

Here is a picture of an...

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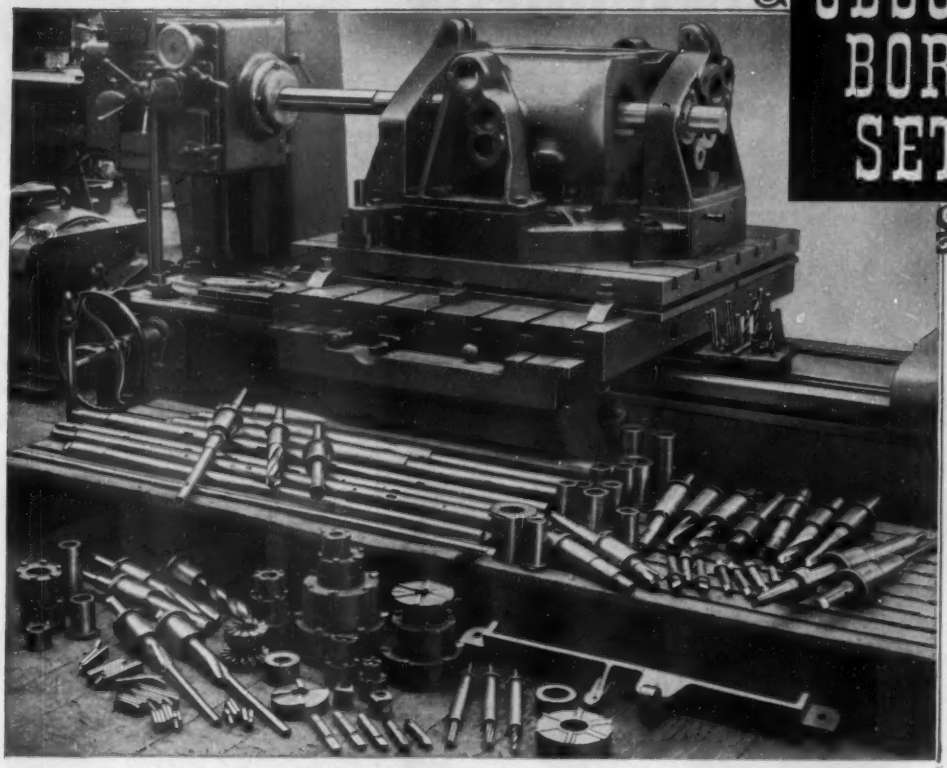

THIS PICTURE— taken in a well known machine tool plant illustrates the old method of boring turret lathe headstocks with a costly inflexible box jig and a mass of special tooling

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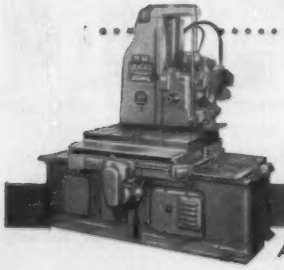

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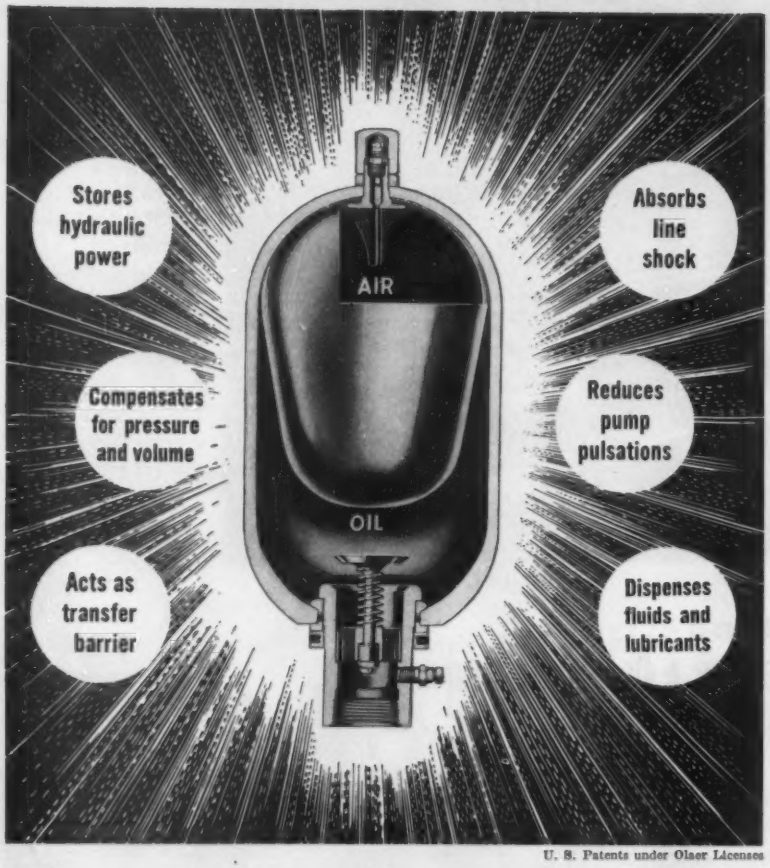

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have had paragraphs written to that effect in the contracts of their staff members, but I have never heard of this being applied to toolmakers. No union would accept such demands.

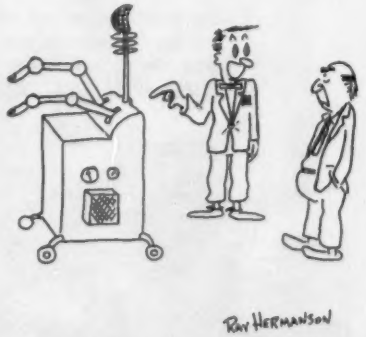
Al is right when he points out that the products of anybody's imagination and ingenuity should be honored by something extra. This is purely an economic principle that pays dividends if applied.

I wonder where Ed got the idea that it is a toolmaker's duty to think up money-saving ideas any more than anybody in the production gang? He is entirely wrong when he says that toolmakers are hired to solve difficult problems. They are hired to make tools from blueprints or verbal instructions, but are not supposed to solve problems, except within their own grade, any more than their production fellow-workers.

If there is any toolmaker so skilled that he is able to solve problems that the engineering department and the master mechanic get stuck on, or didn't care to thrash out, he should not remain as a toolmaker very long but be promoted to master mechanic or a member of the engineering staff. As long as he is kept as a toolmaker, however, his ideas outside of his duties should be written down and put in the suggestion box so he gets paid for them if they are useful.

There is no danger that toolmakers being paid for accepted suggestions would get the notion in their heads to demand a bonus for sharpening their own tools. Such talk is nonsense. The line between the duties of the toolmakers and solving problems that don't belong to them may be fixed so that it is the toolmakers' ordinary duties to do any manual work for finishing all tools but any suggestion on new methods, designs, or tools that prove to be money-savers for the company should be honored by extra money in proportion to the savings made.

I think it is a good scheme to en-



". . . and this little machine replaces the man who pushes the buttons that make the automatic machines work."

courage toolmakers as well as production people by paying extra for extra efforts outside their own duties. To prevent confusions in deciding what constitutes anybody's duties, definitions may be passed by management in each case. Such schemes will pay for themselves many times over.

If no extra money is payed for extra efforts, a man will limit his initiative to the least possible getting-by idea. To extract ideas, figuratively speaking, by a pair of tongs, may be doomed a failure before it is started. In connection with the above I think a lot might be gained if Ed and Al add another word to the title of this topic, and that word is — cooperation!

A E Fristedt
Stockholm-Bromma, Sweden

THE GREAT QUESTION of the hour is, should the toolmaker stretch a point and make it his business to search out such places where production can be increased without expecting his employer to come across with an extra handout?

At times, as I consider this question, my blood pressure skyrockets to dangerous levels, and at others I settle down peacefully where I see some justification in the proposal. Now mind you, I'm not taking sides in this affair, but honesty dictates that I give out with that which is on my mind. Why the poor toolmaker should be picked on at this time is a puzzle. Maybe he's a manufacturing freak. Maybe so; let's pick him to pieces to find out a little about him.

To begin with I will ask how does the life of a toolmaker compare with that of another tradesman? For a quickie answer to that question let me say that he has a cinch. His work is clean and, as a consequence, he can play the part of a gentleman while he fritters away his time. Seldom will you see a toolmaker perspire from overexertion. He takes his own good time and works with methodical precision. He takes great pride in being precise. Wander around through the plant and see if you can find any other tradesman with a pair of trousers with such sharp creases. The man has a pipe of a job and gets good pay for his efforts. In view of this it would seem that a toolmaker should compensate for all his blessings by being on the give, and do whatever he can by suggesting ways and means of improving the production setup without expecting financial handouts.

Who is responsible for the favorable condition in which he finds him-

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RIDGID Work-Saver Pipe Tools

self? He hasn't been given this comfortable station in the manufacturing theater because of any favoritism, but decidedly because of his necessity to the efficiency of production. It isn't every worker who can adapt himself to the delicate touch so necessary in precision work. Some individuals are not so constructed emotionally and do not possesses the right nervous temperment. Many have the urge to please, but their zeal carries them beyond the bounds of reason — they lose that delicate degree of patience so necessary in fine work. It is for this reason that the precision worker finds himself where he is — in the higher bracket.

Because of this, are we to assume that he is obligated in any way to walk that extra mile and strive to do what others do for reward? It is inconceivable that any sane individual would expect such a thing. Effort must be recognized by sufficient remuneration or the flame of ambition will be extinguished. Nothing kills progress more than ingratitude.

By depriving an expert worker of his share of reward, simply because he receives good pay, we are defeating the purpose for which any suggestion scheme was originated. So let us recognize the true value of an expert workman by decorating his chest with the medals of accomplishment. There's nothing like the old do-re-mi of commerce to inspire a man to put out beyond what is expected of him.

Jack Gleason
Glendale, Calif

•

LITTLE BLACK BOOK

What is the best method of handling a worker who is convincing new men in the shop that he has machining data even the foreman doesn't possess? Laugh at him, or fire him?

A MAN OR WOMAN WHO THINKS he or she is indispensable in a company or in fact anywhere, is just asking for trouble. No one person in this world of ours is so important that all time will stand still when he speaks. No person has ever become so important on a job that when he is missing from it that the company fails or stops functioning in that specific department. Many like to think they are all-important. Some like to brag about it, others have the urge to follow those who blow hard and long about their important work. Yet both groups are just ordinary humans with different traits. Both are afraid of the world. Both put on a front to protect themselves from the world.

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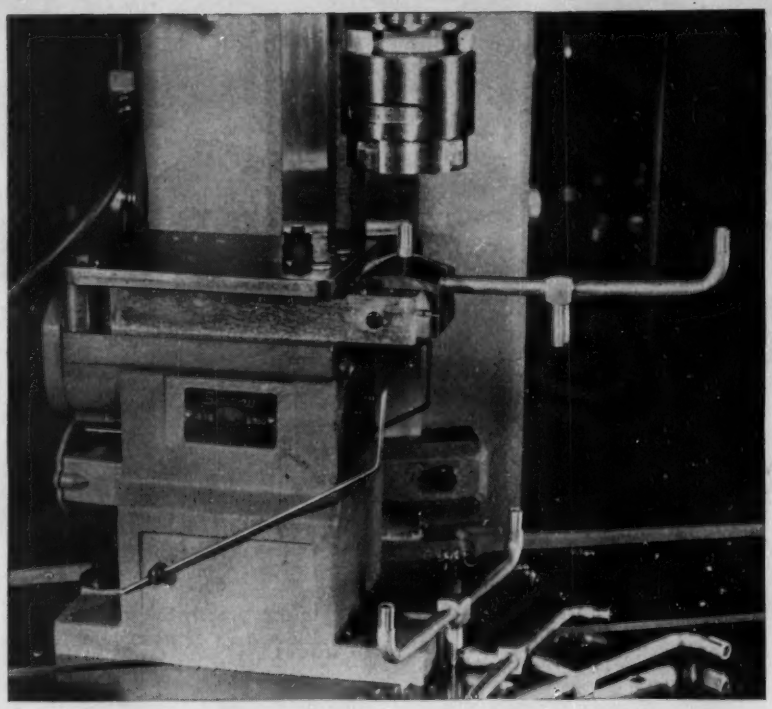

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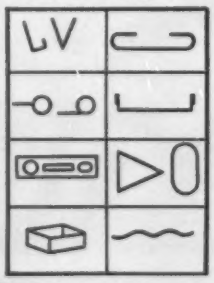

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an extreme because Al has not stopped his doing so before it came to a real showdown. Al knew this existed and apparently condoned it, for he has also used Smith for information. Why shouldn't Smith, under this relationship, feel he was more important than Al? After all, if the boss comes to the worker for data, the worker has something very important to the success of the company,—an inflated ego, but inflated by Al himself. Having reached this state of affairs the problem has become really a taut one. Men in the shop whom Al has failed to properly instruct get their data from Smith instead of from Al. Here again, it is poor shop management on Al's part. But the question is—what to do about Smith.

Our first reaction would be to fire him providing he gives you an opportunity. But today with labor in the drivers' seat and with the cost involved in properly training individuals, this might not be the wisest thing to do. So let us look more closely at the problem. Where does Smith get his data? Does he have an "in" with the Methods Department? Or is he one of those smart individuals who has outguessed Methods and developed them himself? If he has an in with Methods, the quickest way to stop his claims is to see that no information reaches him regarding a job and then let it be known to all the work that he is being given. If he is not really clever and does not have the basic knowledge of how to accomplish the job, then he will fold up. If, perchance, he is on top of the job, then make it known that he is important and transfer him to Methods. For if Smith is really good, don't waste him on a laborer's job . . . just advance him to Methods and let that department use his talents.

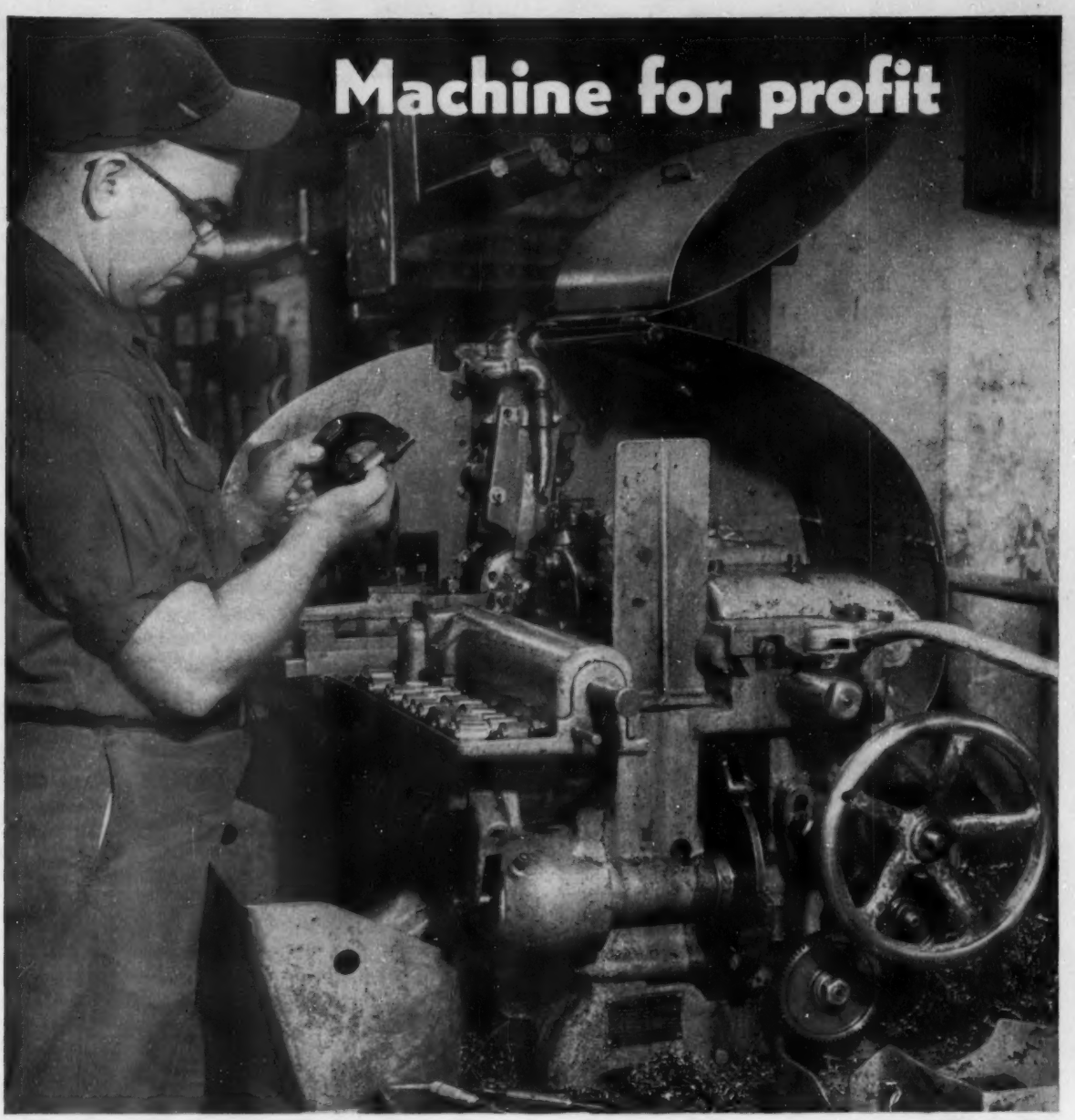
Perhaps this might appear to increase his importance with the company. Actually it reduces it because he will now have to compete with others who have, perhaps, more training and experience. He will not be the one who knows everything. He will probably have to really work to make good, for a shop man often finds it difficult to meet all the requirements of a Methods Department.

In this manner we can relieve the situation in the shop. Al will have saved face and by following up with a talk to his men regarding methods and proper controls of management, again Al can get control of his men. Always caution men that the collection of data used to advance themselves can frequently miss fire and cause trouble for themselves. Remember also that to properly manage is to have complete control of all situations which may arise. Don't promote conditions which may cause trouble by being a party to them. The easiest way is often the most rocky in the end.

Charles D Townsend
West Hartford, Conn

THERE IS A DIFFERENCE BETWEEN ILLUSIONS of intelligence and delusions of grandeur, or shall we say, delusions of indispensability. If, as Al says, Smith really believes he is indispensable to the smooth running of the shop then the time is ripe for Al to "lower the boom." So far as his little black book is concerned, that was merely the entering wedge in a campaign of disparagement leading to the complete undermining of Al's position with the men. The fact that

"Good luck on my old job, Swanson. By the way, I'm leaving a box of ulcer tablets in the top drawer."



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for PEAK PERFORMANCE ADEL Hydraulic Valves and Pumps are setting new and ever higher standards for precision in manufacturing and efficient performance in operation. Following are but a few of the wide variety of models to meet all operating conditions.

GEAR-TYPE HYDRAULIC PUMPS

For 1000 psi service with rated capacities at 1800 rpm of from 1.5 to 46.8 gpm.

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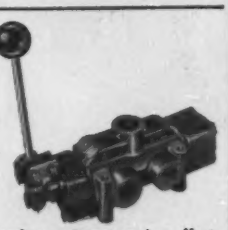

4-way valves with spring-centered, spring-offset, and 1, 2, or 3 position detent action. 1500 psi. Flows to 28 gpm.

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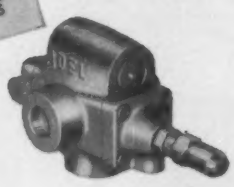

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Al occasionally used the information that Smith had acquired did nothing to dissipate the little myth of indispensability this individual was trying to build up. However, the mischief has been done and the time for remedial action is due.

Just what form this remedial action should take depends upon just how far Smith has gone. If he can be taught the error of his ways by a stiff reprimand without dismissal, then Al should waste no time in getting him told. But from the evidence at hand I would say Smith's walking papers were long overdue. In any event, whatever course is taken, I would advise Al to make it clear to the men that any data pertaining to the job must come from him. It should be a relatively simple matter for him to contact Methods and get all the necessary information put up in convenient form, so that he in turn may give it to the men with the minimum of delay.

The idea that the foreman is too busy to bother with matters like this is a form of mental laziness we are sometimes prone to indulge ourselves in. Probably Al, when approached by one of the men for information, got into the habit of passing off the inquiry with "I'm busy right now, why don't you see Smith. He's got all the dope on that." If he had taken time to consider the matter, he would have realized that what he was doing was in effect delegating some of his responsibility to Smith. In the course of time, if a man wanted information, he, too, would form a habit. He would by-pass Al in favor of Smith and his little black book. So actually, Al himself created the problem, aggravated by the fact that Smith began to get inflated ideas of his own importance and didn't have ballast enough to keep them to himself.

It all boils down to the fact that no foreman should delegate his responsibility to anyone but an officially recognized assistant. If he does so he runs the risk of creating a minor Frankenstein.

Robert S Alexander
Glastonbury, Conn

IT'S A TOUGH proposition for a foreman to have a guy like Smith around to add to his lot of troubles, and Al better put Smith where he belongs.

Al should call Smith into his office and as moral support have his assistant present. He should tell Smith in no uncertain terms to mind his own business where the men and work are concerned; he should be told if the men needed information or advice the place to get it is from the

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For the convenience of cutting tool and fixed gage users and buyers Threadwell presents two more services for more efficient and economical production:

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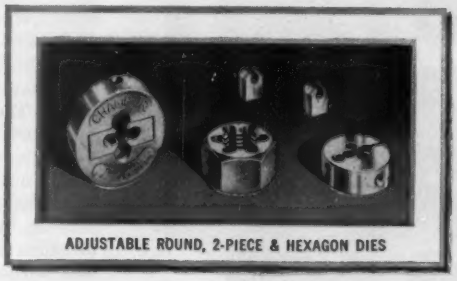

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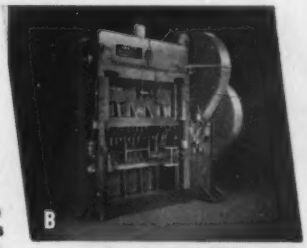
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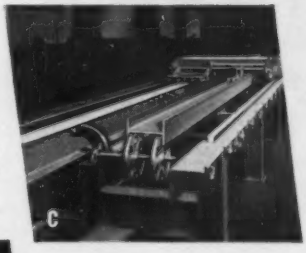
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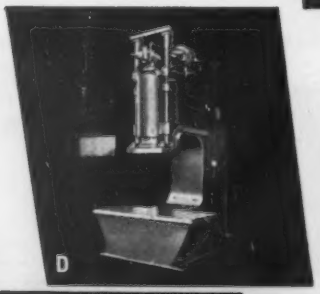
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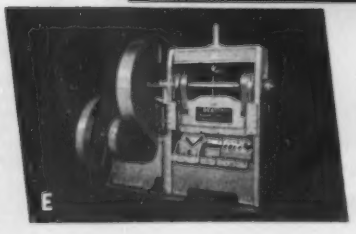
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foreman or assistant and no one else. Al should tell him he has his own work to do and to do it, and if he persisted in butting in on the foreman's function he could expect a little blue ticket for his efforts, and this should be backed with action.

It would be a good plan for Al and his assistant in giving out jobs to inform the workmen to see either of them if information is needed, and not contact any one else. There would not be any need to say who was butting in; the men would soon catch on and the situation would clear itself.

A position such as Al finds himself in cannot be solved by pussyfooting. Positive action is called for to cure a case such as this.

There is no question of the management backing the foreman in a situation of this kind. To maintain discipline is one thing which put him in charge, in addition to getting the work done.

Wm C Betz
New Britain, Conn

•

EVERY EMPLOYEE IS A POTENTIAL PROBLEM and a potential source of trouble in the shop. In order to keep peace in the shop the foreman must stay one jump ahead of the employees. Even a seemingly simple, innocent thing, like Smith's little book can cause dissension and ill will, with a resultant loss of production. The shop must of necessity be operated according to certain fixed standards. If an individual's actions are in contradiction to these standards, he must be corrected or fired.

I believe that Smith compiled his book of standard data for constructive reasons. I have seen many employees make a great deal of effort to cause trouble in the shop. They will spread rumors and start whispering campaigns. They will discover an error on the print and then rush to finish the job just to make the designer look bad. They do all these things and more, but these adverse efforts all have one thing in common, —they are all short-lived. The employee will usually settle his gripe by talking it over with the foreman, or gradually forget about it. Therefore it is my contention that since it took a long period of time and a lot of effort for Smith to compile his little book, he did it with the best intentions. If he was doing it out of anger he couldn't remain angry long enough to finish it.

Since he made up the book with good intention and is now using it as a weapon against the company, something must have happened to change his attitude toward the or-

ganization. The foreman should make every effort to find out just what went wrong. It would be foolish to attempt to combat Smith by telling him off in front of the men. This would not ferret out the cause of the difficulty, but would only serve to make the problem of the book seem more important. Up to this point the foreman can only guess at the cause of the difficulty and can only meet it by fighting back. But once the foreman is successful in determining just why it is that Smith has turned against the company he is in a position to take corrective action. Frequently when these matters are uncovered and brought into the open they lose their seriousness and can be ironed out in an amiable fashion.

After all, the foreman should not feel that he is at odds with the employee and that he must fight him to maintain his position. He must remember that he is there as the representative of management and that the management is operating the company to earn a profit and not to win arguments.

The foreman should in all cases make every effort to determine the cause of the trouble so he can once again have the employees work for the company instead of against it.

Clifford Molloy
Bronx, NY

IT WAS MANY YEARS AGO in Sunday School that I first heard of the "Little Black Book."

"Both St Peter and the Devil," said my teacher, "keep little black books. These books are kept for their benefit. However, a wise little boy can use them for his benefit. I'll tell you how to do it."

Our foreman friend, Al, is upset because his boy Smith is keeping a little black book. Smith is filling the book with pertinent shop data. Smith hopes to make a big shot out of himself at Al's expense. Al's problem is how to use Smith's little black book to become the leader of his men. Here's how to do it Al.

The first step is to analyze the opposition. What are Smith's motives? Smith wants to be important. He wants to belong. He wants to be popular with his fellow workers. He wants to be vital to the organization of which he is a part. He wants to accomplish something. He wants to make the machine shop a better place for his being there. He craves recognition.

Strange to relate, Smith is entitled to all of these wants. It is Al's job to see that he gets them. Al is not doing his job any better

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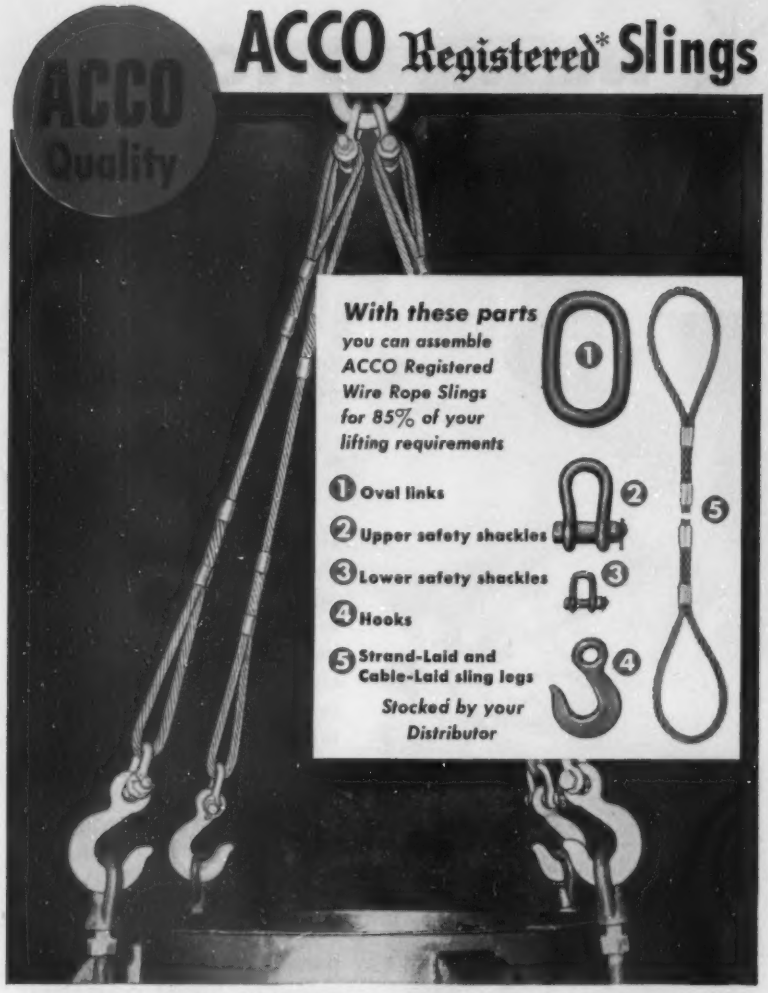
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AMERICAN CHAIN & CABLE

for Better Value

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. • In Canada: Dominion Chain Co., Ltd., Niagara Falls, Ont.

than Smith is doing his. Al has more to worry about in the little black book which his supervisor may be keeping than in the little black book which Smith is keeping.

Let Smith keep his little black book, Al. Help him with it. Make sure his data is correct and up to date. Balance this action by telling Smith and everyone else that the use of this book is just a convenient way of obtaining data which can be got almost as easily through more proper channels. Repeat this story over and over again until everyone is familiar with this fact.

Another alternative is to provide Smith with some other opportunity by means of which he can become a man of distinction. I have supervised the activities of men engaged in the production of high quality products at low cost on schedule for many years. Everyone of these men has been important for one reason or another. Such men enjoy coming to work. They go home with a feeling of having accomplished something worthwhile. Men don't just work for a living, Al; they are trying to build a life, to leave their footprints on the sands of time.

To fire Smith would be proof positive that Al lacks leadership. To belittle Smith would be unjust, uncharitable, and petty. There are times when a foreman has to take it.

Al is obligated to build up the job satisfaction of Smith and of every other man in his department. It takes a leader to do this. In doing this he increases his own stature. A man who helps others make their lives worthwhile is due for a reward somewhere sometime. Men don't keep little black books for no reason at all. Not even St Peter. My Sunday School teacher said so.

Peter A Seward
Swampscott, Mass

"I say, BLABBER MOUTH!"

We put Hydraulic Cylinders on a reducing diet

RESULT:

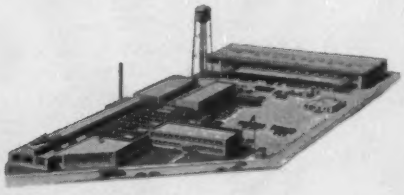
The New VICKERS® "Compact" HYDRAULIC CYLINDERS

For 2000 PSI Working Pressure

Everybody agreed that hydraulic cylinders were just too fat . . . took up too much space. So our engineers put them on a reducing diet. The result . . . these slim, powerful, "Compact" cylinders fit and work in spaces where the old type could not. It is part of Vickers long-time program of continuous improvement.

Among their many other features are: Multiple port positions. Spring-loaded synthetic-impregnated leather rod seal compensates for wear, assures long service. Piston seals are improved cup type. Tie rods are high tensile alloy steel. Adjustable integral hydraulic cushions are available. Comply with JIC standards. Conservatively rated for maximum working pressure of 2,000 psi. For further information, see Bulletin 54-68.

Waterbury Tool Division of Vickers Incorporated where "Compact" Cylinders are manufactured.



Ask for New Bulletin 54-68

VICKERS Incorporated

DIVISION OF SPERRY CORPORATION

1410 OAKMAN BLVD. • DETROIT 32, MICH.

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6950

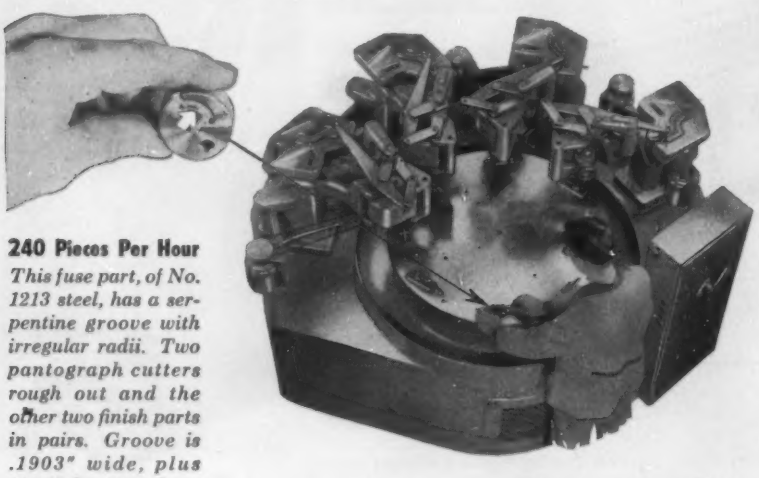
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

High Production

with GORTON MULTIPLE-SPINDLE INDEXING PANTOGRAPHS

Multiple operations with exceptional repetitive accuracy give you production-line performance on Gorton Multiple-Spindle Indexing Pantographs. From two to six different operations, performed at one setting, result in both precision and economy. Automatic cycling during engraving, milling, profiling, chamfering, counterboring, grooving or routing.

Infinitely variable feeds up to the capacity of any existing cutter. Reversing drive for conventional or climb milling.



240 Pieces Per Hour

This fuse part, of No. 1213 steel, has a serpentine groove with irregular radii. Two pantograph cutters rough out and the other two finish parts in pairs. Groove is .1903" wide, plus .0014", by .109" deep, plus .003". Finish: 35 mcr.

194 Pieces Per Hour

These die-cast spectacle frames incorporate "V"-shaped grooves or bezels for left- and right-hand lenses. The bezels do not lie in a horizontal plane but require a "rise and fall" in cutter movement to accommodate convex lenses. This machine mills grooves in both lenses automatically during the cutting cycle.

These machines are custom-built according to customers' specific requirements. With tooling changes, they have many different applications. Write for Forms 2595-DS and 2604-DS on Gorton Multiple-Spindle Indexing Pantographs.

GEORGE GORTON MACHINE CO., 1510 Racine St., Racine, Wis., U.S.A.

MANY EMPLOYEES go to the department union steward when they want something. The union steward is always looking for opportunities to serve. The workers go to the older employee for the same reason. We cannot blame the workers for this if they get the right answer.

Al had better wise up and get a little black book of his own. They are very helpful and all supervisors should have one. No one of us can be expected to remember all the details of modern machining. We cannot hold it against any man because he is enterprising. This is a good quality in any employee. The men know Smith has the information they want and naturally go to him for it. It is easy to get the information right on the floor. I am quite sure the employees know the boss can give them the information they want and a lot more than Smith can give them. The boss is not always handy, but Smith is.

My suggestion would be to make it easy for the workers to get the information they want. Post speeds, feeds, and other details in a convenient place in the department. In this way the employees would not have to go to Smith.

I would also suggest that Al straighten Smith out. A good way to do this is call Smith into the office, thank him for his good qualities and merits, but inform him that you can get along without him if he continues boasting. By calling attention to the good points we can be tough in the cure of faults. Never penalize a man because he is enterprising, unless he tries to gain control. If he tries to gain control by foul means, don't be easy-going.

A E Salmons
Philadelphia, Pa

I DON'T ACCEPT AL'S STATEMENT that Smith is making half the shop's force believe he's the only one who has such data as standard times for machining operations, and jig and fixture details. Today's machinists are not so easily convinced; they are too much enlightened to be fooled.

Ed is right when he says Al can't fire Smith if he's a good worker, just because he's got a big head, and he doesn't give much trouble. Why not just ignore him?

When I served as an apprentice in a repair shop we had a strawboss who had some foolish ideas about how much data he had collected, and how many methods, tools, and machines he knew everything about. He also bragged about how many new devices he had designed and put into production. At that

He isn't on your payroll.

He doesn't have a drawing account.

He doesn't have a desk in your office.

Nor a spot in your shop.

Yet he's been around quite a while.

He knows more about more things than you can shake a stick at.

His experience is infinite and his contacts are legion.

Best man you ever had working for you...

Quite a fellow!

You know him when you see him face to face.

To turn him around, turn this page.

He is an indispensable factor in the economy of the industrial world . . . the expediter who keeps hand and power tools, machine parts, accessories and manufacturing staples coming in order to keep plants going.

He is your nearest, quickest, most dependable source of supply. No other system of procurement has yet been devised to assure smoother, uninterrupted industrial operation.

The Industrial Distributor carries a myriad assortment of active items — in types, designs, grades and sizes to meet your specific needs as well as the needs of other manufacturers from whom you buy equipment, materials, assembly units and other production needs.

He also warehouses countless items of long-interval demand which otherwise would tie up your own capital—or expose you to the risk of slow-up or shut-down.

He knows where and how to obtain scarce or sorely needed requisites—thus sparing you the time and expense of searching for them yourself.

He explores the globe for new and improved appliances that may speed up your production, cut your costs, improve your product.

He is a veritable "encyclopedia" of information for keeping you up to date on new practices, processes and paraphernalia.

As a "clearinghouse" for your purchases from all sorts of producers far and near, your Industrial Distributor relieves you of a lot of accounting and other "paper work." By similarly serving such producers in their distribution, he ultimately brings you still further benefits.

. . . he represents your Industrial Distributor

• Nicholson believes in and has adhered to this principle of MARKETING THROUGH SERVICE for more than 40 years. As a result, Nicholson Distributors and their field men learn how to WORK FOR YOU. They become experts on files and filing—right down into your shop where the right use of THE RIGHT FILE FOR THE JOB counts in the way you want it to count. • There are throughout the U.S. more than 875 near-at-hand Industrial Distributors of Nicholson and Black Diamond files; and over the years few of them ever leave us—or you.

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World's foremost manufacturer of

A FILE FOR EVERY PURPOSE

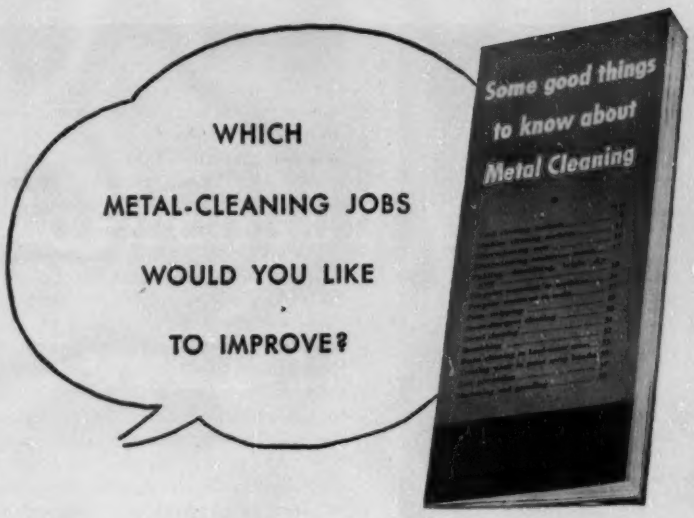
time I was not experienced enough to understand what it was all about, but today I know enough to laugh at all the silly things he told us. A real craftsman never boasts.

Standard times may be calculated by Methods, but the safest way is to take time on each operation; working methods requiring jigs or fixtures is nothing definitely fixed,—they develop as time goes on. All such data should be registered by the engineering department. If Smith has not followed up new impulses given from time to time and kept his data up to date, they are probably worthless. And how is it that he alone got these data? Haven't they been collected on his working time? Why hasn't Al followed up these matters himself? Evidently Smith is very much conceited when he thinks he can fool half of the crew in Ed's and Al's shop, and therefore the old-timers might as well give him a horse-laugh.

Necessary data should, of course, be given on the drawings to save trips to the files. And in any foreman's office there should be a complete set of handbooks for reference on standardized matters. A little black book where some data on any product have been registered is probably insufficient in our times. Pioneers like Taylor, Emerson, Gantt, and others, had to collect data of their own because there were no dependable reference books available. Today, however, there are plenty of reference books and standard time data in any industrial country. I have myself engineering books in English, German, and Swedish. And also, if a foreman wants to be up-to-date, he must follow up reference tables such as given in this magazine. If he fails to do that he'll soon find himself behind times.

If Smith is collecting data to use

"The boss and I took the afternoon off and went to the ball game and I had the misfortune to run into him."



Listed below are some of the operations discussed in Oakite's 44-page handsomely illustrated booklet on Metal Cleaning. Please check the list. Then let us show you how Oakite methods can give you better production with greater economy.

Technical Service Representatives in Principal Cities of U. S. and Canada

SPECIALIZED INDUSTRIAL CLEANING
OAKITE
MATERIALS • METHODS • SERVICE

OAKITE PRODUCTS, INC.
24 Rector St., New York 6, N. Y.

Send me a FREE copy of your booklet *"Some good things to know about Metal Cleaning"*. I am particularly interested in improving methods for the following jobs:

- ☐ Tank cleaning
- ☐ Machine cleaning
- ☐ Electrocleaning
- ☐ Pickling, deoxidizing
- ☐ Pre-paint treatment
- ☐ Zinc phosphate coating
- ☐ Paint stripping
- ☐ Steam-detergent cleaning
- ☐ Barrel cleaning
- ☐ Burnishing
- ☐ Rust prevention

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Lusol

will outperform any other coolant in your machines in your own shop

Read about this

amazing challenge, and what Lusol All-Chemical Metal Working Solution has done for others, on the opposite page . . .

for himself, Al should tell him he is wrong and that he must turn them over to the company, as they then would be available to everybody. Should he fail to do so it would be best for himself to leave on his own accord. Al doesn't have to get his men together and tell them the truth —they know the situation.

I don't think Smith is undermining Al's authority with his men—he can't do that. They know who is the foreman and whom they should pay attention to. If Al's men are so ignorant on disciplinary matters that they don't know who is their boss, Smith or Al, then it's high time to run a course on company time with full pay, to inform the men what they should do, or else fire that half of the gang paying attention to Smith. They would be worthless in any shop. But I think everybody but Smith has more sense than Al will admit.

Smith should not be told off before his fellow workers. If anything should be said to him it is up to Al to tell him in his office, then there would be no chance of claiming Al was picking on him either. On the other hand, if Smith is carrying a chip on his shoulder, looking for trouble, and trying to get Al's job, then Al should talk to one man at a time telling them how stupid Smith is. That would straighten the men out as they know nobody is vital in any organization.

A E Fristedt
Stockholm-Bromma, Sweden

THE PROBLEM IN YOUR APRIL ISSUE on the "Little Black Book" is an interesting one that has a very easy solution.

Smith has shown himself a much better man than the average machinist. He has the ability to write, and keeps records that even a lot of foremen can't do. He has shown himself to be a good prospect for either a foreman's job or a job in the Methods Department. All too often you get men in the Methods and Planning sections who do not have practical experience, and a machinist in there could give valuable advice.

Another feature to this solution is that it would show the other workmen that anyone can get a promotion and would tend to encourage others to study.

H F Tincombe
Montreal, Canada

IN EVERY SHOP there are big heads, square heads, and knuckle heads in various percentages, and few of them do anybody any good. Smith will be found in one of these categories.

Back in the dim past there was a foreman, who certainly knew his business, and he carried a little black book. He seldom referred to it because he was thoroughly conscious of the book's contents and could give any man or apprentice who inquired the answer right off the bat.

His little black book could be borrowed by any worker, but it had to be returned to him each night before quitting time.

As apprentices, many of us copied information from that little book, for it was all good, and some of it is in existence today as is shown in some of our modern handbooks.

Now, in regard to Smith, it is hard to classify him.

He may have had good information, but it was like a reserved seat in a theater, for sometimes it was hard to get.

When a man puts forth the idea that he has something out of the ordinary and swaggers around because of it, he is imposing upon his department as well as the firm.

Now, returning to Al, he could

"He had to have a bi-focal lens installed."

"demonstrating Lusol is a pleasure...I've never failed on a test"

Lusol

IS THE ALL-CHEMICAL MACHINING COOLANT

The man quoted has seen Lusol make good on machine after machine, in plant after plant, for the past seven years. He knows machine tools and metal working practices, because he has supervised production in some mighty important factories. So you can trust his judgment.

Here's how he proceeds, if you ask to see proof of Lusol's ability to outperform any other coolant in your own plant:

1. You select a machine on which production has been quite satisfactory.
2. He supervises cleaning of that machine; sump, piping, hidden surfaces. (Ordinary coolants leave a lot of "gunk" buried in a machine).
3. He installs Lusol properly diluted with water for the operation involved.
4. Your supervisor can then play with speeds and feeds, check tool life, metal finishes, and operators' reactions to Lusol.

We'll bet you a Stetson—Your man will report results like these: Speeds and feeds are higher than he ever thought possible. Tool cutting edges and grinding wheels stay sharp longer.

Finishes are finer. There's no smoking to foul the air. No rusting of products. No skin irritation and workers' clothing stays cleaner.

To get this test working, *mail this coupon*—

We'll have a Lusol field engineer call and arrange to run the test in your own plant.

F. E. ANDERSON OIL CO., INC.
PORTLAND, CONNECTICUT

F. E. Anderson Oil Co., Inc., Box 215, Portland, Connecticut

Have your man call to discuss arrangements for installing Lusol All-Chemical Coolant in the machines selected for this test.

Name_____ Title_____

Company_____

Address_____

Send me the booklet, "Lusol Gets to the Point" ( )

for a fabulous finish...

Jewel Brand
ABRASIVE BELTS

For grinding, smoothing, polishing — metal, wood, leather, plastics, rubber. A grit for every purpose — prompt service on every purchase.

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561 Pearl Street
South Braintree 85, Massachusetts

discuss Smith's actions with each individual man and apprentice as opportunity offered, or, as Ed suggests, get the men together and tell them the whole story and inform them that there are books which would be good for them to study and, further, these books are indexed as to class of information making it easy to look matters up.

As a matter of interest, it might be well to have Smith in the meeting and observe if his head shrank any.

Firing Smith might help, for the men, perhaps, would get their own books and learn much more than Smith could tell them.

Such men as Smith are nuisances, for no matter where they are, they disorganize a department and keep it in an uneasy state of affairs. While he may be the best man in the shop, he costs the dough paid for lost time on the parts of himself and others.

Fire him and the morale will improve.

F H Stebbins
Worcester, NY

I KNOW JUST THE KIND OF A BIRD who has Al running around in circles—mentally, of course. In a physical sense, Smith, the observant Sherlock Holmes, is to my way of thinking a pinch of emery dust in a bearing and the very attitude that he takes makes the machinery of production grind with obvious difficulties.

These so-called black-bookers are shrewd customers. Don't trust the guy, Al; he should have been a barber as, from all indications, he seems to be adept in the use of a sharp instrument. I recall the little black book method used by another such super-I-am in my earlier years in industry. This vulture of opportunity was a smooth, quiet-speaking lizard who bided his time and struck with the viciousness of a rattler when the occasion arrived. The difference between this viper and Al's ulcer-producer was that his recordings were vengeful in purpose. He had a couple of pages of insignificant instances which he was saving up to present to the next higher boss at the stroke of twelve.

Al's ego-stuffed problem evidently went at his advancement along a different line, but from the opinion of those who are enabled to appraise the effectiveness of such measures, this cock-of-the-walk Smith, evidently practiced Napoleonically with the idea of some day becoming president of the land of free enterprise and its allied problems. I ponder over the gains this school-kid tactition expects to gain from hoarding a mass of figures other than that it lends itself

Nozzle for jet plane's air conditioner which keeps cockpit temperature down.

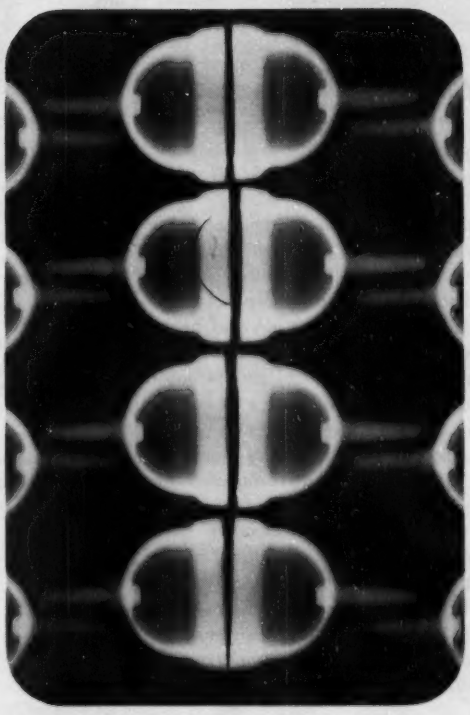
RADIOGRAPHY *says:* "O.K. to Machine"

COMPLEX MACHINING is required to transform this casting into the precision nozzle of a jet plane's air conditioner.

Fourteen intricate, curved vanes are cut in the rough casting's rim. Tolerance is .002 inch. This means plenty of high-cost machine time—which could be a total loss if it is left to the cutting tools to find any defect in the casting.

Radiography avoids that . . . shows up shrink or other faults before machining is begun. Only those castings proved sound are worked. Time and money both are saved.

Easy to see, isn't it, how radiography pays off? And if you would like to know other ways it can help you, like improving yield in production runs, here's a suggestion: Talk it over with your x-ray dealer. Or, if you like, drop us a note saying, "Send me a free copy of Radiography as a Foundry Tool."



Radiograph shows castings with "shrink"—saves costly machining time.

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N.Y.

Radiography . . .

another important example of Photography at Work.

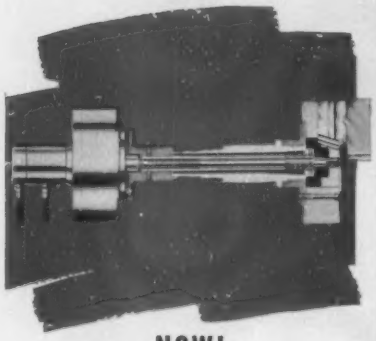
Kodak

NEW

SKINNER

"JUNIOR"

POWER CHUCKING UNIT



NOW!

Maximum production speed for your small lathes TOO!

This Skinner "Junior" unit can be adapted to almost any small lathe with 1" to 1⅜" hole through the spindle. It is light in weight, precisely balanced to minimize spindle bearing and braking loads, and provides extreme repetitive accuracy on internal and external work.

The Skinner 8" self-centering power chuck has gripping capacity from ¼" to 6". Its ¼" jaw travel exceeds the capacity of any collet, and is particularly valuable on production work where rough or finished holding diameters may vary beyond a single collet's ability to grip.

The Skinner "Junior" unit is complete. It contains chuck, 6" aluminum air cylinder, adapters, draw bar, etc.

Write Skinner or your nearest Skinner distributor for illustrated folder.

THE CREST SKINNER CHUCKS OF QUALITY

THE SKINNER CHUCK COMPANY

203 Edgewood Avenue, New Britain, Conn.

to providing material for some kind of a kid game.

I don't think it reflects in any way a threat to the structure of Al's kingdom, because the men of sound judgment in his department will look upon this industrial peanut as being just what he is. Let's call Smith a nut and shave off all the trimmings. If the man is a good workman, let him play around so long as he doesn't interfere with the affairs in the shop. What you can do, Al, to relieve your own mind and have a little fun out of it is to play him up. Go to him and tell him what a big shot he is and how you appreciate the interest he is taking in production. Ask him if you might take a look at his father's and grandfather's pictures. You know, Al, give him the impression that he is so damn big that he'll bust a gut finding another job himself. Sic some of your trusted friends to do the same and you'll find that soon he'll discontinue the practice or get out.

As far as straightening out the men who half-believe him, Al should take into consideration that all workers aren't endowed with sound, common sense and some are prone to accept any situation that comes along. Maybe a talk, periodically, would do the whole department some good if it is couched in terms suitable for departmental advancement. One of the things to be stressed in these talks is the value of minding one's own business.

So, my friend, Al, take my words for what they are worth but weigh them with care. I know that if you do your part toward the interest of the men, and maintain their confidence, you will pave the way for better harmony, diminution of intrigue, and the ineffable joys of efficient production wherein the thorns of black book hallucinations are decidedly not in evidence.

John Homewood
Burbank, Calif

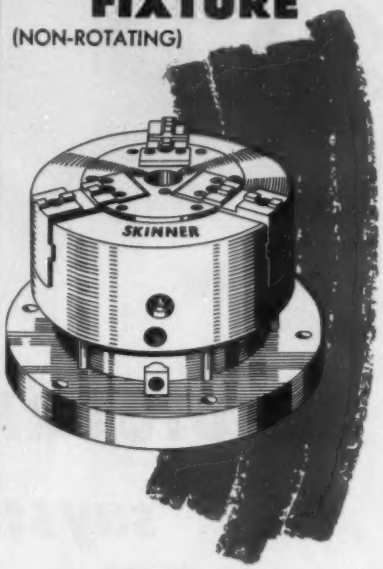
"How's the new cooling fluid work, Joe?"

NEW

SKINNER

POWER CHUCK FIXTURE

(NON-ROTATING)



POWERFUL! ACCURATE! FAST! DURABLE!

Close coupling makes this Skinner Power Chuck Fixture the lowest, most compact unit of its type! Air-operated, it can be used on drilling, milling and transfer machines, and for assembly operations.

Special wedge action provides tremendous gripping power. Self-centering, self-locking. Available in 8", 10" or 12" dia., with 2 or 3 jaws. Operable with either a Skinner hand valve or a 4-way solenoid or foot valve. ⅜" pipe connections. Maximum air pressure: 100 lbs.

Write for Bulletin PCF 67

THE CREST SKINNER CHUCKS OF QUALITY

THE SKINNER CHUCK COMPANY

203 Edgewood Avenue, New Britain, Conn.

Announcing

a completely AUTOMATIC, self-contained, PORTABLE drilling unit with advantages you expect only in expensive machine tools

Peck drilling four deep holes in a magnesium casting

THE NEW SERIES 92A KELLER "AIRFEEDRILL"

—locks to any jig or fixture, and drills accurately. Stationary mounting brackets available

—operates automatically through the complete drilling cycle—advances, drills, retracts, shuts off—at a single pressure of the control valve

—handles peck drilling and skip drilling

—gives complete control over motor speed, drilling speed, torque, rate of advance, and depth of hole

It has these operating features:

SENSING TYPE RAPID ADVANCE brings the drill point quickly to the work, then drops instantly to the drilling rate.

TORQUE CONTROL causes automatic retraction as often as necessary to clear chips during peck drilling. It also protects drills and indicates when they need sharpening.

FEED CONTROL permits adjustment to varying drilling conditions, as well as the material being drilled.

VARIABLE SPEED MOTOR controlled by throttle valve . . . shuts off automatically at end of drilling cycle.

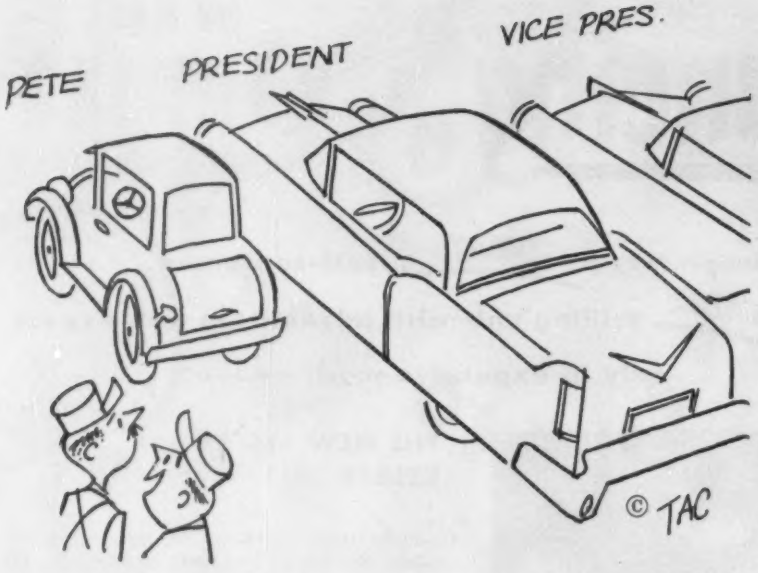
Lightweight and compact—ideal for use in portable or stationary applications

These and other features mean that you can tool up for a few hundred dollars . . . instead of thousands. Send for Catalog Section 92 which fully describes and illustrates this remarkable new tool.

KELLER "Airfeedrill"

SERIES 92A

KELLER TOOL COMPANY, 1303 Fulton St., Grand Haven, Mich.



"Pete's been close to the 'Old Man' ever since he suggested Columbia MOLITE High Speed Steel!"

COLUMBIA TOOL STEEL COMPANY • CHICAGO HEIGHTS, ILL.

Producers of fine tool steels — All types immediately available through Sales Offices, Warehouses and Representatives in Principal Cities.

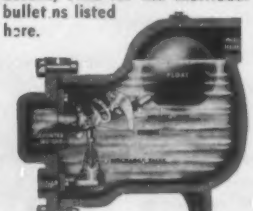
TOOL COLUMBIA STEELS

Send for Nicholson Bulletins on These

3 WAYS TO SAVE TIME

in Production and Maintenance

On the basis of their time-saving records, leading shops are increasingly standardizing on these 3 Nicholson units. For details, send for the individual bulletins listed here.



NICHOLSON AIR TRAPS—For intercoolers, aftercoolers receivers, tanks, etc. Feature non-plug and non-wire-drawing valve. Instantaneous operation and extra large drainage capacity effect fast, positive action. Catalog 953.

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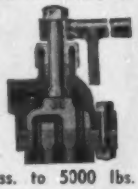

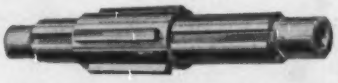

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PARKIN' PRIVILEGES

Do certain privileges accorded a foreman, such as a reserved parking spot, tend to increase prestige and respect for his job among the men, or will it have the reverse effect?

I READ THE DISCUSSION between Al and Ed with great interest. I have always had a good deal of respect for foremen and for their ability, and would like to express my views on the subject.

The present-day shop foreman may not be the overlord of past years but he is still an important cog in the gear train of plant production. The significance of his position may appear to have diminished, but actually the reverse is true. There are now a multitude of assistant foremen, squad leaders, and lead men between the foreman and the men working under his direction. Also there are a number of intermediaries between the foreman and management. I believe that these changes are simply the result of organizational growth, and are not the result of a conscious effort to usurp the power of the foreman.

The foreman of today must be the possessor of an amazing volume of knowledge, skill, and information. He must know the how and why of all the work going through the shop. He must be ready to assist in machine repair work, development of new methods, and new tooling. He is frequently called on for assistance by the methods men and the tool designers. He is usually consulted before new tools and machines are purchased. He must be ready to discuss the feasibility of design changes and tooling programs.

The successful foreman must be a diplomat, capable of handling men as well as tools and machines. He must be tolerant and capable of riding to work with the porter, having lunch with the master mechanic and having dinner with the plant manager. He must be friendly with all, yet firm and positive in his manner. He must back up the men when they are right, and back up management when they are right.

As a result of his position any good foreman must stop and think twice before accepting any privilege. Will the men frown on him if he accepts? Will management frown on him if he refuses? The problem of the parking space is a good example of the type of problem facing a foreman. If the foreman accepts a reserved space, it should not create any dissension, provided the location is selected with care. It should be a loca-

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tion consistent with his position in the plant; certainly not the best position, or he will refuse it, and certainly not the poorest spot in the lot. Perhaps a space at the edge of the reserved area would suit him fine.

H G Koslow
Bronx, NY

MODERN SCIENTIFIC MANAGEMENT has whittled away many of the old type foreman's powers until he has become a liaison officer between the shop man and the higher executives. Process planning, shop loading, personnel and employment officers, and safety engineers have all taken away from the foreman some of the power which he used to wield. Despite all this, he is still an important link in the managerial chain. Shop men are fully aware of how much power the foreman can exercise and it should be the duty of higher management to enhance the prestige and authority of their representative on the shop floor.

The job of foreman in some British firms is nothing to write home about. The pay is not much greater than that enjoyed by a first-class machinist, the responsibilities are still pretty heavy and he has to suffer the kicks from both upper management and the shop. The best laid schemes for smooth running of production shops often come unstuck, and it is in the coping with such unforeseen emergencies that the foreman comes into the picture. Because of his intimate knowledge of the resources of plant and men under his control, the foreman can often get over an awkward crisis which would tie the shop in knots if he were not there to unravel the mess.

Modern management is becoming increasingly complex, and although some duties have been lifted from the foreman's shoulders, he has had others dumped back in their place.

The foreman often enjoys the privilege of being paid for time lost through sickness; he is relieved from punching the time clock; he can roam about the shop as he chooses and can penetrate to other departments without being challenged. On the debit side of his job he carries a load of responsibility and is expected to put in longer hours than standard, without extra pay, if required to.

The shop employees are completely aware of the foreman's importance to the firm, and in some cases his prestige will vary in direct proportion to the perquisites which he enjoys. If the foreman is no better than his shop men and is as "under-

privileged" as they, then it is not reasonable to expect his authority to have a very high value. The foreman should be an important man; the measure of importance varies from one nation to another. With some it is the maintenance of a dignified aloofness of manner; with others it is a case of cash and privilege. The power to hire and fire is one of the greatest boosters of foreman prestige.

Getting down to the practical side of holding up the foreman's head, the allocation of a parking space in the car lot with his name on it is a small thing which will reap benefits in enhancement of his prestige whilst insuring that he will be at work on time. In most British firms it is common practice to have a separate dining room for foremen and other minor executives. This might seem to be a snooty practice, but it is practical in that it enables the foremen to discuss shop problems freely with a reasonable amount of privacy. Other perquisites of the foreman's job are facilities for visiting trade exhibitions and shows on company time. The object of these little details is to insure that the foreman is not merely an up-graded machinist, as regards his importance in the general scheme of management.

Without advantages it is very difficult to persuade progressively minded machinists to make the transition from shop floor to foreman's desk. This reluctance for the average machinist to become a foreman is very noticeable in some firms, and it is not uncommon for some managements to be at their wits' end to find a suitable man who will step into the vacancy when it occurs. Without adequate inducements in

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the way of financial gain, security of employment, and slightly better working conditions, good foreman material will not be available for hire.

Clifford T Bower
London, England

BEFORE WE START a discussion on the problem, let me say that congratulations should go to the company for becoming aware of its foremen. If Ed and Al are working for a company which is aware that its foremen are something besides laborers, then perhaps there is hope for them to gain back a little of the prestige of the real old days when the foreman, in the words of Ed, "was as important a character as the plant manager—almost."

During the last decade or longer companies have looked down upon their foremen, or not considered them, and the men working in this capacity have grown into a group with inferiority complexes. It is only human for us to develop warped ideas when subjected to pressure and not properly guided. For if each and every foreman were to be given the proper guidance and instruction, our industrial structure would be truly democratic, and companies now struggling for existence would have been successful.

Some companies have found this out and are really trying to right a wrong, but they now meet with resistance. Why? Just think a bit about your own position. Have you been given the breaks, or has politics robbed you of advancement? Suppose your boss were to suddenly say "Bill, we want to help you advance and therefore, we are going to do something for you." Wouldn't you be a little wary of the move? Wouldn't you think there was a string attached? The answer is undoubtedly yes. Then multiply this feeling by the years, and quickly you can see the reason for foremen hesitating to accept the new concept of industrial life. It is impossible for them to be suddenly transformed into an important being when for years they have been snubbed. They always will look for the string attached and refuse to believe that the company has reformed, and is really willing to admit that the foremen are the front line of management.

Industrial leaders have discovered that the foremen can make or break a company. How? By public opinion. The foreman is in contact with hundreds of individuals. If the foreman is uncertain, and questions the integrity of the company, its policies, what it stands for, and how it oper-

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Many thanks for your interest.

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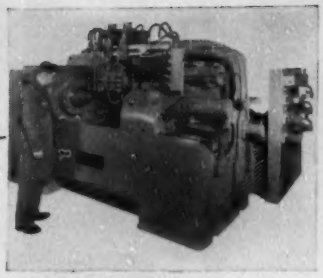

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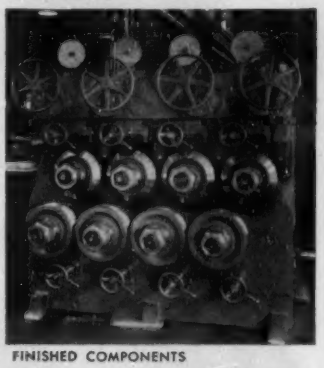

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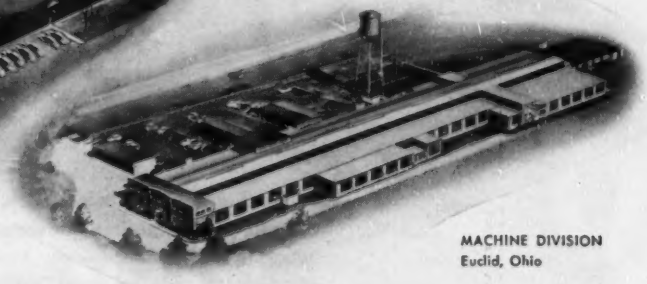

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ates, then he makes the workers uncertain. They naturally add their own touches to the thinking, and before long the company is either considered the best in town or it is rated the worst of them all.

The attitudes of men are truly set forth by Al who is always looking on the dark side. The trend toward parking reservations is a step to try to help conditions that exist in many companies. Whether name or number is used matters little. Most officials care little. We always have the egoist who must see his name in print, but the fact that a place is reserved for them is what is important to most.

As to those who try to make out they are superior to all other individuals, we can only say that seems to be human nature, unchanged through the ages. Stop to think—don't they take the same attitude in all things?

There is no reason to show off just because one receives a parking space. Our advice is to accept the move without complaint or undue criticism. Don't make mountains out of molehills. If others try to strut and act over-important, always remember that they will some day meet their Waterloo.

A foreman has a job to do. It is an important station in the life of the company. Therefore, act accordingly. Be yourself and try to be a better foreman. Encourage the company to help you do your job better and take your rewards graciously.

Charles D Townsend
West Hartford, Conn

THIS STORY reminds me of the aircraft plant which employs my services. In this plant, the parking lot is so big, the employees so large in number, that being without a reserved parking place is real pitiful, especially when you time rolling into the lot a little too close.

Now foremen, especially in this particular place, do not occupy a pitiful position. So they have reserved parking places. And why not? If I were a foreman, I'd expect it. Especially here where foremen are put through an indoctrinating course and taught that they are in a class above wage-paid employees. (Foremen are salary-paid here.)

Of course, the foremen are human in their attitude toward the workers, respect them, and so on; it's just that they are not expected to mix too much with the help. Might make them prejudiced, you know. Which would be very bad. Semi-annual employee labor grade re-rating de-

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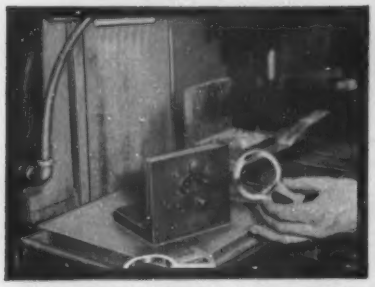

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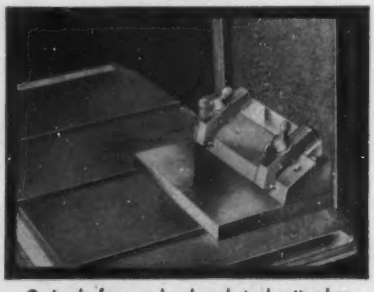

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mands impartiality. Democracy is not abused, though—you can call the foremen by their first names.

Edward Diskovich
Torrington, Conn

I HAVE OFTEN HEARD the foreman complain that the top brass have a parking space alloted to them, but I have never heard one complain or gripe about having one reserved for himself.

A man's name to him is usually the sweetest sounding word of any found in the dictionary. He should be happy that the firm is making it convenient for him to park his car, and post his name in a reserved spot. It is a good plan to take care of the parking problems of the employees.

Continually finding fault with management spreads through the plant like a bad disease. It creates unrest and scatters discontent throughout the shop. It is a childish attitude on the foreman's part and probably one to cover up a weakness—a feeling of inferiority. If the foreman is not interested in his work, or management, he should look for another job. Some foremen never grow up to the fact that any fool can criticize, and that getting along with management and others depends 90% on our own attitude. To fulfill our responsibility to our employers serves as an advantage to each of us. This is the only way we can reveal our true value as supervisors.

A E Salmons
Philadelphia, Pa

THERE SHOULDN'T BE any question as to the wisdom of according special privileges to valuable personnel. From my viewpoint, it is a matter of conserving time and energy, and will pay off, because anything that stabilizes the mind is an asset of no little value. Take care of the minds of your high-priced big shots and they will function to meet any challenge that confronts them. Having special parking places available for valuable employees wasn't conceived because it was felt that the wheat should be separated from the chaff, nor was the idea that of elevating the favored ones from the crowd of "menials." We have no such thing as caste in industry and I am grateful to my parents for bringing me over when they did.

We all know how disconcerting it is to try to find a parking place for our cars. It would be very nice indeed if we could all have reserved spots, but let's be practical and make the most of a situation by favoring

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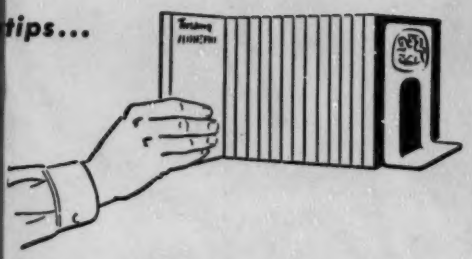

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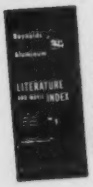

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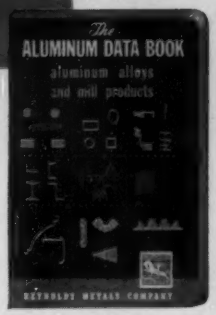

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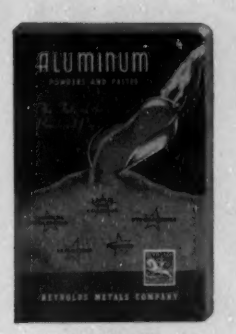

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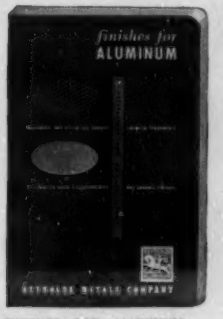

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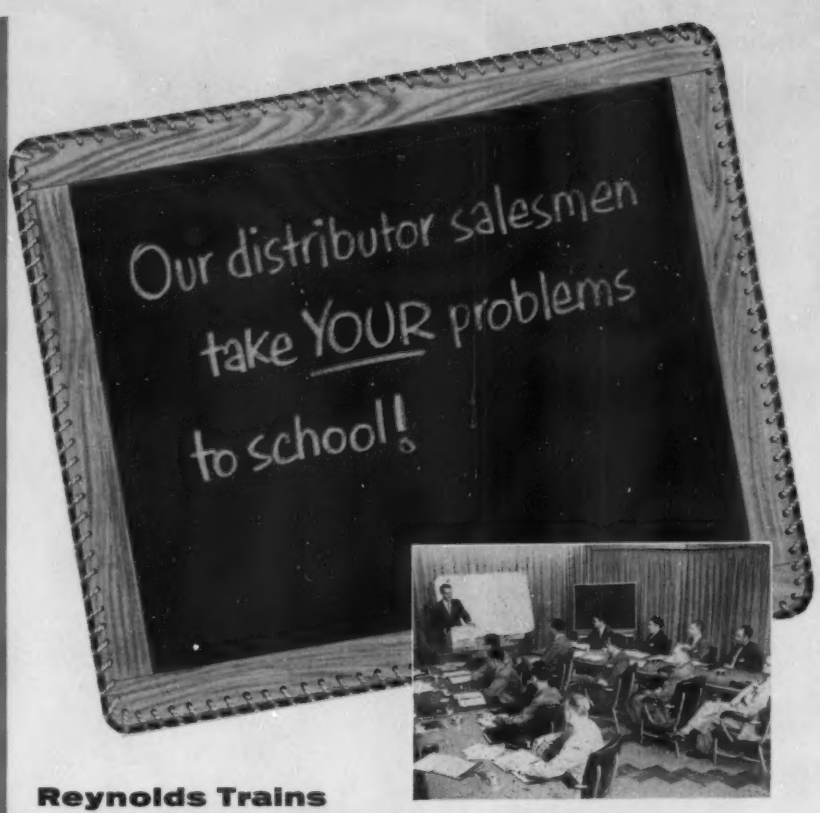
United States Steel Supply Div., Los Angeles
COLORADO
Salt Lake Hardware Co., Grand Junction
CONNECTICUT
American Steel & Alloys Corp., Hartford
DISTRICT OF COLUMBIA
Lyon, Conklin & Co., Inc., Washington
FLORIDA
Horne-Wilson, Inc., Jacksonville, Miami, Orlando and Tampa
Southern States Iron Roofing Co., Jacksonville, Miami, Orlando and Tampa
GEORGIA
Southern States Iron Roofing Co., Albany, Atlanta, Augusta and Savannah
IDAHO
Salt Lake Hardware Co., Boise
ILLINOIS
Aluminum Distributors Inc., Chicago
J. G. Braun Co., (Architectural only) Chicago
Sipi Metals Corp., (Ingot only) Chicago
United States Steel Supply Div., Chicago
Benjamin Wolff & Co., Chicago
INDIANA
KENTUCKY
Southern States Iron Roofing Co., Louisville
LOUISIANA
Southern States Iron Roofing Co., New Orleans
MARYLAND
Clendenin Bros., Inc., Baltimore
Lyon, Conklin & Co., Inc., Baltimore
MASSACHUSETTS
Bay State Refining Co., (Ingot only) Chicopee Falls
Arthur C. Harvey Company, Boston
MICHIGAN
Kasle Steel Corporation, Detroit and Grand Rapids
McDonnell Bros., Inc., (Architectural only) Detroit
Meier Brass & Copper Co., Detroit
Milton A. Meier Co., (Ingot only) Detroit and Grand Rapids
MINNESOTA
MacArthur Co., (Architectural only) St. Paul
United States Steel Supply Div., St. Paul
Vincent Brass & Copper Co., Minneapolis
MISSOURI
American Alloys Corp., (Ingot only) Kansas City
Industrial Metals, Inc., Kansas City and St. Louis
NEW JERSEY
Barth Smelting Corp., (Ingot only) Newark
Edgcomb Steel Corporation, Hillside
Mapes & Sprowl Steel Co., Union
NEW YORK
Barth Smelting Corp., (Ingot only) Newark, N. J.
J. G. Braun Co., (Architectural only) New York
Edgcomb Steel Corporation, Hillside, N. J.
Mapes & Sprowl Steel Co., Union, N. J.
Ontario Metal Supply, Inc., (Wire, Rod, Bar) Rochester
NORTH CAROLINA
Southern States Iron Roofing Co., Raleigh
OHIO
The Atlas Metal Co., (Ingot only) Cleveland
The G. A. Avril Company, (Ingot only) Cincinnati
Bridgeport Brass Co., (Wire, Rod, Bar) Cleveland
Kasle Steel Corporation, Cleveland
Mutual Manufacturing & Supply Co., Cincinnati
Voryx Brothers, Inc., Columbus
OREGON
Woodbury & Company, Coos Bay, Eugene, Medford and Portland
PENNSYLVANIA
Athos Steel Service Co., Philadelphia
Leico Corporation, Pittsburgh
McDermott Metals Co., Inc., (Architectural only) Philadelphia
Merchant & Evans Co., Philadelphia
Pennsylvania Industrial Supplies Co., Inc., (Wire, Rod, Bar) Pittsburgh
Potts-Farrington Company, Philadelphia
Nathan Trotter & Co., Inc., (Ingot only) Philadelphia
SOUTH CAROLINA
Southern States Iron Roofing Co., Columbia
TENNESSEE
Southern States Iron Roofing Co., Memphis and Nashville
TEXAS
Moncrief-Lenoir Mfg. Co., Dallas, Harlingen, Houston, Lubbock, San Antonio and Temple
Vinson Supply Co., Dallas, Odessa and Snyder
UTAH
Salt Lake Hardware Co., Salt Lake City
VIRGINIA
Southern States Iron Roofing Co., Richmond
WASHINGTON
Clingan & Fortier, Inc., Seattle
WISCONSIN
Benjamin Wolff & Co., Milwaukee

Look Under "Aluminum" in Your Classified Telephone Directory



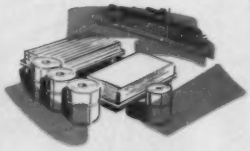
Reynolds Trains Distributor Salesmen in Aluminum Know-How to Give YOU Better Service!

Before your aluminum problems arise our distributor salesmen are trained to meet them. In Reynolds sales clinics these men learn the basics of engineering with aluminum—learn where and how and when to use the technical assistance of Reynolds staff of experts. Most important, perhaps, distributor salesmen become familiar with the vast Reynolds production facilities—know the practical limitations of mill production.

Reynolds sales training clinics also offer the opportunity for salesmen to exchange ideas and experiences. Their practical education is broadened by what they've learned from you and other aluminum users.

It all adds up to this—when you call for Reynolds Aluminum, Reynolds-trained salesmen make sure you get the best in *Service*, too.

...plus these advantages

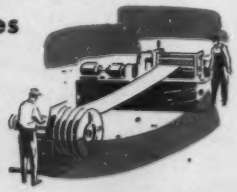


CONVENIENT WAREHOUSE STOCKS

Eliminate capital tie-up in obsolete or idle inventory through convenient warehouse stocks . . . cut your stock record keeping, reduce your accounting cost and warehouse overhead.

YOUR PARTNER IN PRODUCTION

When required, distributor salesmen will help on your production problems, backed by Reynolds technical service men in the field and the fully integrated staff at Reynolds home office.



EXTRA EQUIPMENT THAT LOWERS COST

Slitting, cutting, shearing, sawing and other specialized operations are money-saving distributor services. Put this equipment and service to work for you to help lower your costs.

See "Mister Peepers", starring Wally Cox, Sunday nights on NBC-TV

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

the people who have more important things to think about.

A foreman who feels sensitive about having a special berth assigned for his white-walled dreamboat, because he resents the idea of being considered as being in the snooty class, is a rare individual indeed. Refusing to take advantage of such a privilege indicates that he has something wrong with his upper story. If he does that kind of thinking while on the job, he could be very well replaced. I'm talking about you, Al, because you are off your beam.

Some brilliant mind conceived the idea of separate tables for higher-ups which I, and many others of the overall-and-apron class, looked upon as being just too much to swallow. This was over twenty-five years ago. As the fellows sat eating their lunches at the common tables, some unkind remarks were directed at the "elite" who fletcherized their beans and whatnot in the glass-enclosed section reserved for them. Time healed the wounds, and now most of the men can see the reason for it. It has two purposes: one is that it does away with trouble-making fraternizing between the executives and the men, and the other is that it allows the big shots to discuss among themselves matters of no immediate consequence to the workers. Could it be that such an arrangement was conceived with the thought in mind that it would act as an incentive?

There are some who would disapprove of extending special privileges to anybody, claiming that it would not be democratic to do so. The "brains" of a plant are worth taking care of and any expense called upon to do the job would reap dividends in more effective work. Then again we have the other element in our industrial makeup who claim that special privilege should

"The new oiler . . .? He said he was taking time out for a refill . . ."

Wire and Ribbon Metal FORMING MACHINES

Mounting production costs are driving firms out of the competitive picture. Too much scrap metal! Too many single operation machines! Too many operators! This whole picture can be changed to a highly profitable operation. Install a NILSON combination press and 4-Slide forming machine. This machine takes wire or ribbon metal directly from the coil, straightens, feeds, pierces, blanks, swages, stamps, or coins, cuts off and forms . . . automatically in one quick precise operation. See the new picture? . . . Increased production! Minimum scrap metal! One machine for all operations! One operator!

For specific recommendations . . . send details of your operation.

THERE'S NOTHING LIKE A NILSON

NILSON has been specializing in Forming Equipment for over 50 years.

THE A. H. NILSON MACHINE COMPANY
1519 Railroad Avenue • Bridgeport 5, Connecticut
CHICAGO • CLEVELAND • DETROIT • LOS ANGELES • HAMILTON, ONT., CANADA

MAKE "JACK-OF-ALL-TRADE" TOOLS *Obsolete!*

174 different end mills — in diameters varying from ¼" to 5" — with 2, 3, 4 or 6 flutes — and straight or taper shank — make Nelco the line with the widest selection of standard sizes!

On every application, every material — there's a specific Nelco end mill in stock designed to do the job — and do it better, quicker and at less cost than it's ever been done before! Here are the facts to prove this astonishing statement:

Specific rake angles are engineered for each individual tool to guarantee maximum performance and life!

Selection of the hardest practical grade of carbide for each end mill makes available from stock the most efficient tool to do your specific job!

All Nelco End Mills are spiral fluted for easier chip clearance, finer finish and superior tool performance.

All taper shank end mills are available with detachable tang for interchangeable draw bar or tang drive use.

Eliminate "jack-of-all-trade" tools! Select a Nelco End Mill from stock, engineered to save hours and make dollars for you! Call the Nelco distributor in your vicinity and send today for your free copy of the new 48-page Nelco catalog.

NELCO TOOLS

For that Extra Edge in Production

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

extend to all. When that happens the purpose is completely lost.

I wouldn't go so far as to have a brilliantly-coated attendant open the foreman's door to permit him to step out on a soft rug. He doesn't need to be humored that much but, from the standpoint of effecting greater efficiency in permitting him to pursue the day's activities with all his faculties perking on all six, I would do what I could to eliminate obstacles.

Frank Van Horn
Auburn, Calif

NOT ONLY IS IT A MISTAKE, but it is very inefficient to allocate parking spaces to individuals. If an individual is off sick, away on business, or on a vacation, then a perfectly good parking space is wasted while someone else who could use it to advantage is compelled to park at a distance, all of which is just plain silly, a cause of dissatisfaction, and the subject of adverse criticism of the firm's "brain trust."

The most satisfactory method that I have seen for obtaining complete use of the firm's parking area is to divide it into two lots, each with an "In" and "Out" drive. The entrance gates are opened by a properly designated "guard" half an hour before starting time. First the shop lot, and second the office lot. This guard then aids every arrival to back his car into a parking space. The first arrival gets the choicest space near the shop entrance, which is very desirable, particularly on a rainy or snowy morning. Each space on each side of the driveway is filled consecutively as the men or the departmental heads arrive, and no one gets any favors. The men who get to work early are appreciated, and get the handiest parking spaces. The late ones have to park near the far end of the parking lot, if there is space; otherwise they must seek a place on some nearby commercial parking lot. Even if the company space is not filled, the gates are shut as soon as the starting whistle is sounded and they are not opened until noon, ex-

"This is a good place to work after you get used to the heavy breathing!"

Here's modern press control at its SAFEST

Yes, with the **Schrader Two-Hand Press Control** you'll find operator confidence soars—and so does production—because this easy-to-install unit can be operated only by both hands simultaneously. This means:

1 ***Production hits new highs*** **as operators, no longer worrying about personal safety, develop a new high-speed work rhythm in short order.**

2 ***Production stays high,*** **because the effortless fingertip operation with Schrader Controls leaves operators fresh and alert, even after a full day's work.**

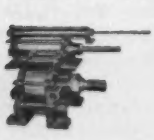
Look over the mechanical-clutch machines in your shop. Wherever you find operators straining back and leg muscles to maintain production—tiring themselves so that they are less alert to safety precautions—*there's a real need for Schrader Pneumatic Controls.* Available for easy foot operation as well as two-hand operation as shown here, Schrader Control Sets come complete and ready for mounting on your presses.

Ask us to help you decide which of the several Schrader Control Sets will fit your needs best. Simply write us, outlining your installation—or fill out the coupon below.

Schrader

REG. U. S. PAT. OFF.

Leaders in air control since 1844



A. Schrader's Son
Division of Scovill Manufacturing Company, Incorporated
460 Vanderbilt Avenue, Brooklyn 38, N. Y., Dept. F-1

I am interested in more information on _____

Name _____ Title _____

Company _____

Address _____

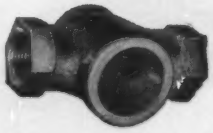
GOSS & DeLEEUW

AUTOMATIC CHUCKING MACHINES

perform one to three operations in sequence or simultaneously . . .

TO CUT PRODUCTION COSTS...

More completely finished parts at the end of the day with no partly finished pieces lying around is the regular accomplishment of Goss & DeLeeuw "1-2-3" chuckers. It means complete finishing on one, two or three ends simultaneously or in sequence without tool resetting, rechucking or parts handling. Machining operations may include boring, facing, turning and threading.



Change over from job to job is simple. Cost-cutting is assured on long or short runs. Goss and DeLeeuw Chucking Machines are the only standard machines of their type which operate the "1-2-3" way to reduce costs per piece and step up the number of pieces per hour.

Investigate the opportunities offered by these machines on your production by sending samples of your work for time and cost estimates—Ask for illustrated descriptive literature.

GOSS & DeLEEUW

GOSS and DeLEEUW

MACHINE COMPANY, KENSINGTON, CONN., U.S.A

cept in case of sickness or accident, and then only upon receipt of an order signed by the foreman.

The office force is handled in the same manner, and this method certainly is a powerful incentive for employees to arrive on time; the late ones hate to have to park in a commercial lot and pay the charges. This was proven soon after the system went into effect, when a surprising increase in the number of early birds appeared.

At noon the guard opens the exit gates and those who are parked near the building entrance drive away promptly while the others have to walk farther to get to their cars, and thus the cars clear out without trouble or conflict. The guard is there to stop any occasional dispute.

The only improvement made after the parking space procedure was organized was the installation of a pedestrian walk at the rear of the rows of parked cars; everyone had to use this walk, thus entirely clearing the drive of pedestrians for the exclusive use of cars; this speeded up the car movements. Making everyone park by backing also eliminated confusion, for at noon and quitting time everyone was set to drive forward as soon as a gap appeared in the departing line of cars.

Some of the departmental heads at first resented having occasionally to park in a commercial lot, but they got no sympathy from the management, who also was under the same system. The only exceptions were for a few top men who had to come and go, and for these a row of garages was built.

After this system had been in use a short time everyone seemed pleased with the arrangement for there was no opportunity for the sore heads to grouch about the fair-haired boys getting all the breaks—because no one got any.

George P Pearce
Albuquerque, NM

PARKIN' PRIVILEGES

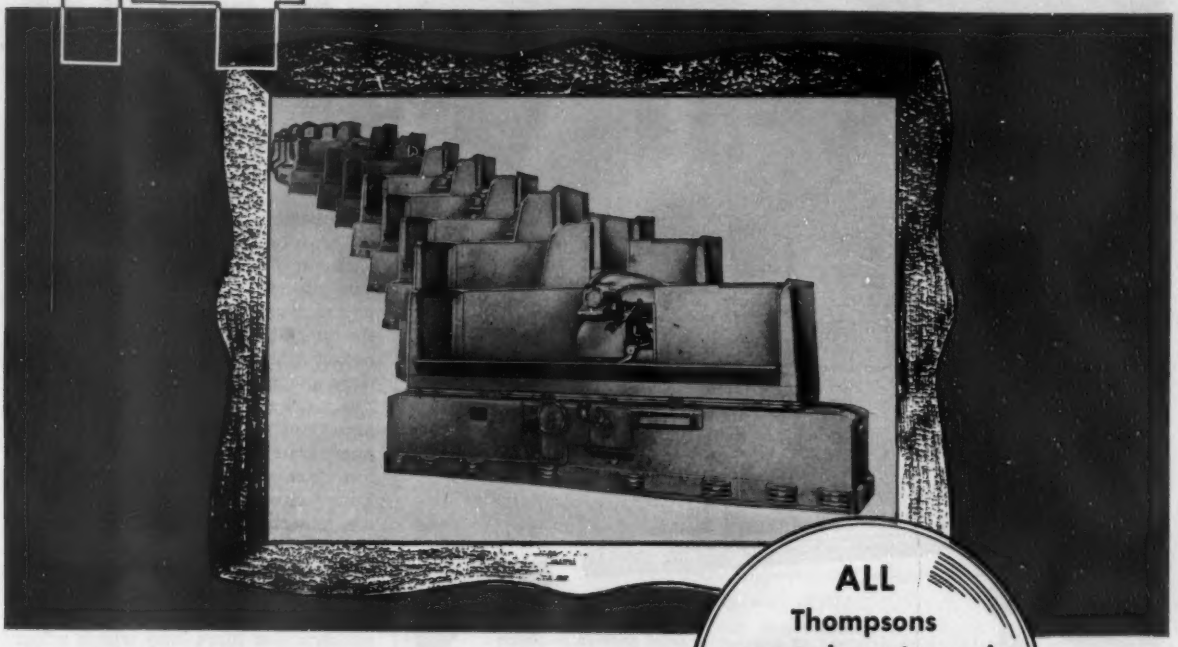
FOR WANT OF A NAIL, a shoe was lost. For want of a shoe, a horse was lost. For want of a horse, a kingdom was lost. For want of sagacious industrial supervision, a vital part of the American way of life, the free enterprise system, may be lost.

Industrial workers want to be more than mere wage earners. They want to be important, to be recognized, to belong. They want to work for a boss who is important, who is recognized, who belongs as a part of management. The parking privilege, the right of a foreman to park his car in a reserved space on com-

LOOK CLOSELY AT THIS PICTURE
OF GRINDER PRODUCTION AND SEE WHY...

14 *is a lucky number*

for a manufacturer requiring precision grinding



ALL Thompsons operated continuously with much LESS DOWNTIME

that's why

it will pay you to invest in

Thompson Grinders

After twelve years continuous manufacture of precision ground products, ten Thompson Surface Grinders proved so efficient and economical that this manufacturer ordered four more machines.

Thompson Grinders are available in a wide range of types and sizes from 6" x 18" to 72" x 384" to meet all production, special or tool room grinding requirements. The Thompson line includes machines from giant Hydrial Way Grinders to automatic Truform Jet Blade Contour Grinders, Dual Rotary Grinders and Broach Grinders.

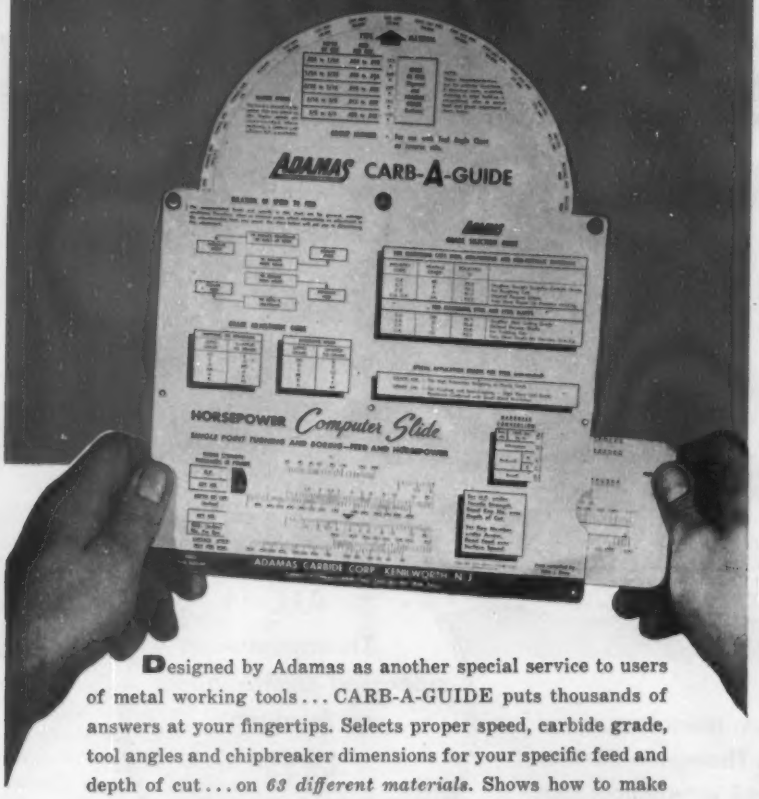
CONTACT THOMPSON TODAY FOR HELP WITH YOUR MACHINING PROBLEMS

THE THOMPSON GRINDER COMPANY
Springfield, Ohio

for quick, sure answers to your carbide application problems...

ADAMAS
TUNGSTEN CARBIDE®

CARB-A-GUIDE



Designed by Adamas as another special service to users of metal working tools... CARB-A-GUIDE puts thousands of answers at your fingertips. Selects proper speed, carbide grade, tool angles and chipbreaker dimensions for your specific feed and depth of cut... on *63 different materials.* Shows how to make necessary adjustments in speed, feed, and grade. Includes speed conversion, milling feed, horsepower computer slides. Send for your CARB-A-GUIDE today. It's your assurance of maximum efficiency from the best in tungsten carbide—Adamas Carbide.

ADAMAS CARBIDE CORPORATION

DEPT. 1A KENILWORTH, NEW JERSEY

Please send _____ Adamas Carb-A-Guides ($1.00 each enclosed) to:

NAME _____

COMPANY _____ TITLE _____

ADDRESS _____ CITY _____ STATE _____

ENCLOSED $ _____

pany property, is a tangible mark of recognition. It is a sign of importance. It is concrete evidence that the foreman belongs as a part of management.

This is a democratic privilege. The foreman is important because the men he supervises are important. The work these men do is important. A good foreman so conducts himself that whatever glory is attached to him is merely a reflection of that of his men. The foreman should not be timid. He should not shrink from any show of importance by refusing to accept a specially reserved parking space. Any recognition of the foreman is an acknowledgment of the importance of his men.

As far as the men working for him are concerned, the foreman is the company. Stockholders want it this way. Boards of directors want it this way. Top executives of progressive companies want it this way. Organized labor wants it this way.

The foreman is that part of management in the most advantageous position to represent the company to the workers. He can distinguish the worker from his work. He has been trained to recognize and appreciate the problems of the company. The workers and their activities are uppermost in the foreman's mind for approximately eight hours a day, five days a week. He has first-hand knowledge of their character, ability, emotional makeup, and home life. He knows what has been told to his men and what they tell to others. It is only natural that men want their boss's opinion on all matters which affect them, and which affect the company. The more prestige accorded the foreman by the company, the more weight will his opinions have with the men in the shop.

A foreman should be a sincere salesman and an appreciative buyer.

"It's a simple job and you're just the man for it."

He sells himself, the company, and the principles under which our business system operates. He must appreciate the enterprise he helps manage, and the workers who are its backbone. Workers crave appreciation. Such appreciation comes best from their immediate boss, the man who knows them best, the foreman.

Top management can make the foreman's appreciation more potent by adding to the prestige of his job. The parking privilege is one way of doing this. In days gone by, the prestige of the foreman was greater than it is now. The industrialist was a leader in the community and the nation. Foremen had as much authority as responsibility then. As the prestige of the foreman declined in the shop, the prestige of the industrialist declined in national affairs.

The foreman's prestige declined as top management gave him more and more assistance on the job. An employment office hires his help. Planning men tell him how to do his work. Production men tell him when to do it. Technicians tell him how to process his material. Purchasing agents do his buying. Wage-rate men tell him how to pay his men. Accountants tell him how to make his charges to the last detail. Labor-relations men tell him how to maintain discipline in the shop and how to get along with organized labor. Community-relations men tell him how to conduct drives for the Community Chest and the Red Cross.

For what these people leave untold there are division, operation, and section managers, assistant managers, superintendents, assistant superintendents, general foremen, assistant general foremen, and various specialists to take up the slack. Everybody gets into the act.

A foreman was rated on his ability to be a good listener. He had to keep his mouth shut to get ahead. However, things have changed during the past several months. The newest crop of industrial leaders were aware of the ridiculousness of this setup. They have made some changes and many more are in prospect. The management of practically all big corporations is becoming decentralized. Recognition is being given to those as close to the grass roots as is possible. The foreman's job will gradually become more important. Foremen must accept and strive to be worthy of whatever recognition is accorded them—the "parkin' privilege," for example. It is a small thing perhaps. But so was the nail in the horseshoe.

Peter A Seward
Swampscott, Mass

SHELDON
CHICAGO U. S. A.

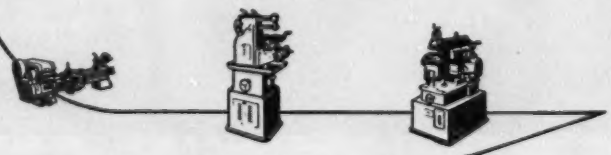
More will be *profit* with a Sheldon

It actually costs less to do most turning jobs on a Sheldon Precision Lathe. Machine-tool investment is cut to a fraction. Power cost is materially reduced. Less experienced operators can operate Sheldons safely and efficiently. Even cost-loadings for plant—floor space, heat and light are lower because two Sheldons can often operate in the space occupied by one large lathe.

On most "everyday" jobs a Sheldon will actually turn out more pieces per hour too. With double V-belts to the spindle Sheldon lathes deliver enough power to take a healthy bite in direct drive, at really high speeds. Sheldon's "Zero Precision" Taper Roller Bearings permit work to the closest tolerances. Very seldom if ever are such extremely accurate bearings used in other lathes.

You will actually keep more as profit if you use Sheldon Lathes wherever possible.

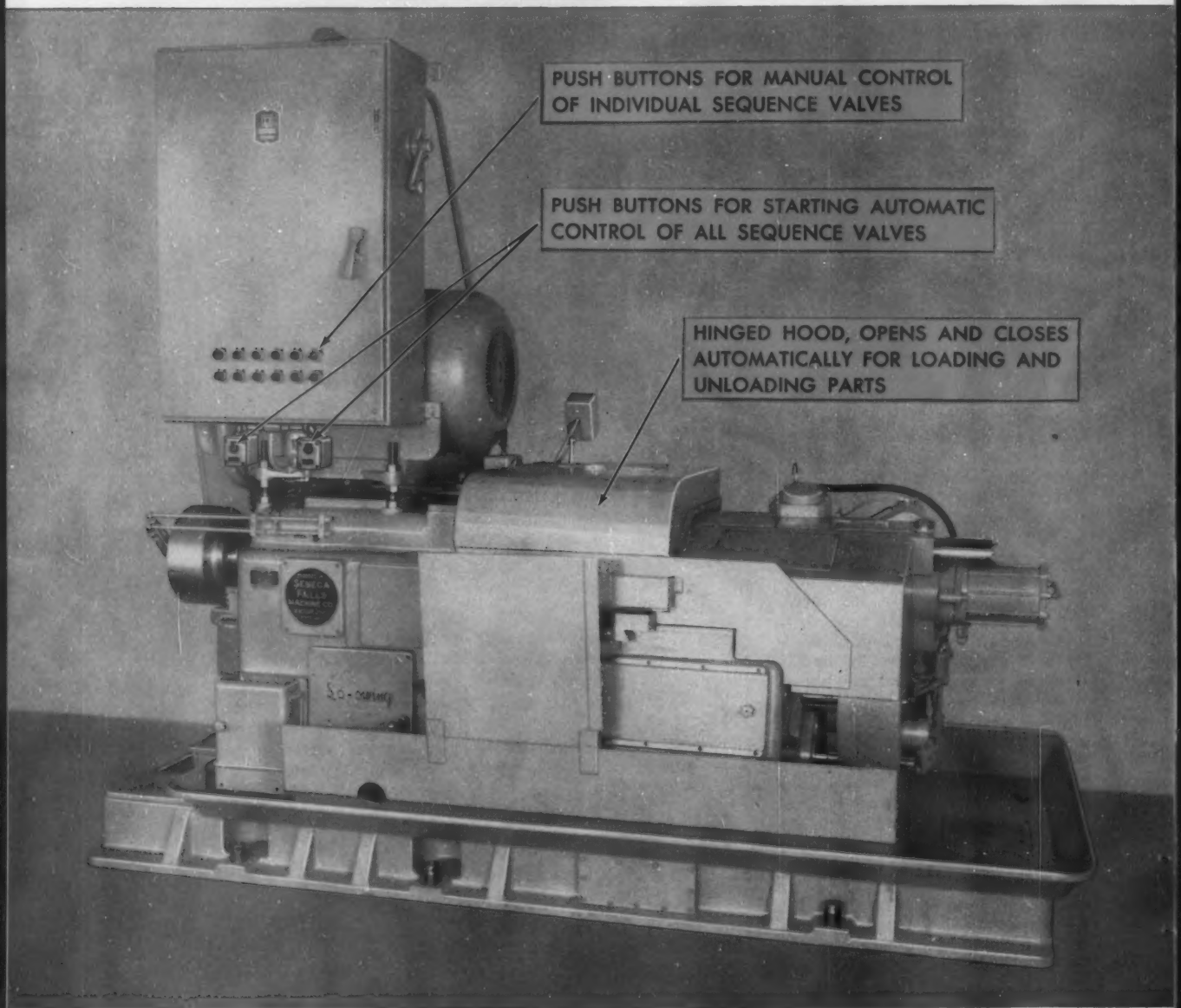
Write for Catalog



SHELDON MACHINE CO., INC. 4234 N. Knox Ave. Chicago 41, Illinois

MACHINE OF

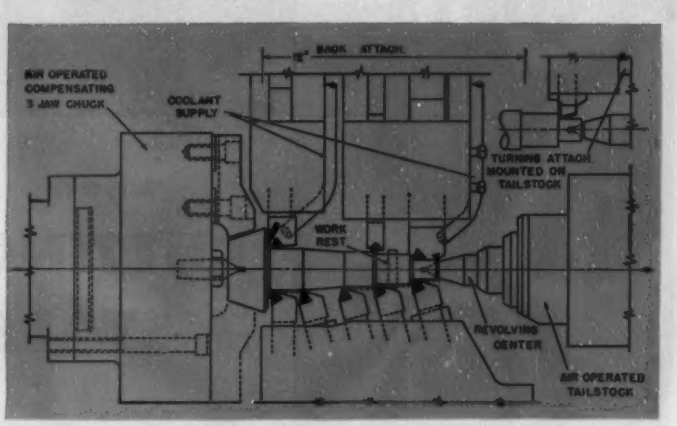
So-swing LATHE EQUIPPED WITH AUTOMATIC CONTROLS REDUCES HANDLING TIME


PUSH BUTTONS FOR MANUAL CONTROL OF INDIVIDUAL SEQUENCE VALVES
PUSH BUTTONS FOR STARTING AUTOMATIC CONTROL OF ALL SEQUENCE VALVES
HINGED HOOD, OPENS AND CLOSES AUTOMATICALLY FOR LOADING AND UNLOADING PARTS

PRODUCTION COSTS

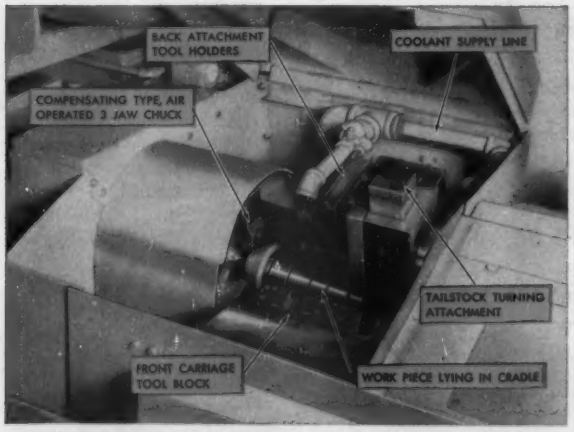
THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



Problem: **To reduce handling time and operator fatigue in machining operations on Axle Pinions.**

Solution: **A Model AR Automatic Lo-swing Lathe, tooled as illustrated, was selected for this job. Work is held on centers and driven with an air-operated, three-jaw compensating chuck. Five carbide front turning tools, two of which are template operated, reduce the length of cut to 1-7/8", which is the length of the taper portion. An additional tool, mounted in a tailstock turning attachment, partially removes surplus material on the threaded diameter in advance of the front turning tool which finish turns this diameter. Six carbide tools on the rear slide face and chamfer the shoulders.**


BACK ATTACHMENT TOOL HOLDERS
COOLANT SUPPLY LINE
COMPENSATING TYPE, AIR OPERATED 3 JAW CHUCK
TAILSTOCK TURNING ATTACHMENT
FRONT CARRIAGE TOOL BLOCK
WORK PIECE LYING IN CRADLE

▲ *Hinged hood in open position for loading and unloading parts.*

◀ *Tooling area of machine is entirely enclosed, protecting operator from flying chips and coolant.*

The machine stops automatically at the end of the cycle with spindle stopped, chuck jaws released, tailstock center retracted, hinged hood open and with the machined part dropped into a cradle. The operator simply replaces the finished part with a rough forging and then pushes the two starting buttons, energizing the loader controls, which consecutively close the hood, places the work between centers, closes the chuck jaws and finally starts the headstock spindle rotation. The automatic cycle from then on is controlled by automatic camming built into the base machine.

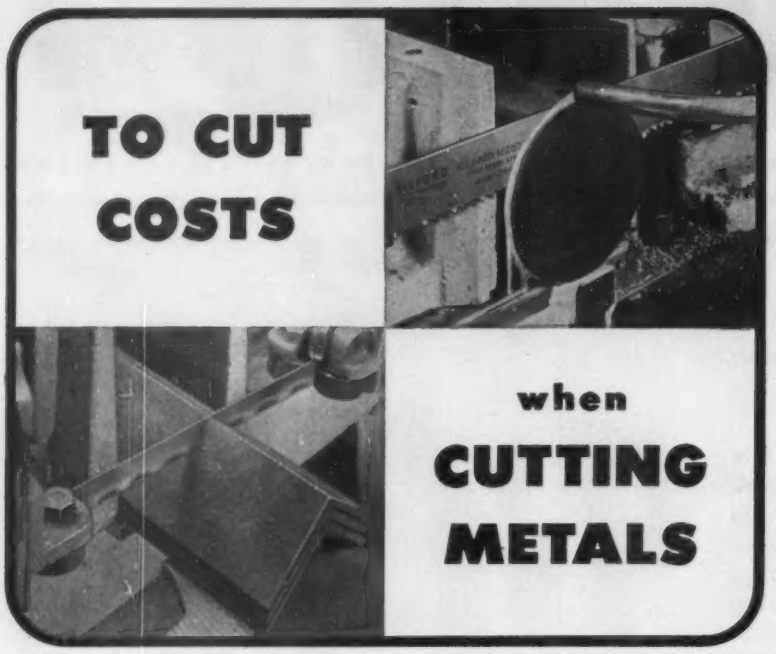
The tooling area of the machine is entirely enclosed to protect the operator from flying chips and coolant, while cutting at high spindle speeds. Two starting buttons, wired in series, oblige the operator to use both hands, and are so located that the operator is out of range of the closing hood, thereby preventing accidents.

Control buttons on the door of the starter panel permit normal operation of individual controls and are convenient for setting up and timing loader movements.

Seneca Falls engineering staff is at your disposal to help solve your engineering problems.

SENECA FALLS MACHINE CO., SENECA FALLS, N.Y.

ARE LOWER WITH *Lo-swing*



Consider these Facts . . .

When you buy machine tools, it's not the initial cost that counts — it's the production these tools deliver! And with metal-cutting saw blades, it's the performance . . . the quality of the sawing . . . the life of the blade that determines the true value of the purchase.

For over 75 years, MILFORD has specialized exclusively in the manufacture of hack and band saw blades. Original MILFORD Band Saw developments include the Wavy-Set Blade and the High Speed Steel Band Tool . . . outstanding examples of MILFORD's research leadership.

But, in the final analysis, the proof of product superiority is found only by use in your plant with your materials and equipment. Your nearby MILFORD Distributor is ready to arrange a demonstration for you. Contact him, or write to the factory — today.

THE HENRY G. THOMPSON & SON CO.
Saw Blade Specialists for Over 75 Years
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New Books . . .

COST ACCOUNTING (3RD EDITION)—*By John G Blocker, chairman of the accounting dept, University of Kansas, and W Keith Weltmer, associate professor of accounting, University of Kansas. Published by the McGraw-Hill Book Co, 330 W 42nd St, New York 36. 623 pages, 6 x 9 in. Price, $6.50.*

THIS third edition of what is primarily a college text on cost accounting has been revised to bring it up-to-date with refe rence to recent laws affecting accounting.

The most important change is the complete rewriting of the chapter on payroll accounting, to explain the latest changes in Federal, state and local laws governing deductions from payrolls, and other significant changes in the law.

Three new chapters are added—Variances from Standards; Cost Analysis for Management Decisions; and Cost and Income Charts. Also, chapters dealing with cost accounting for banks and governmental units have been dropped, because they are too specialized for this text.

•

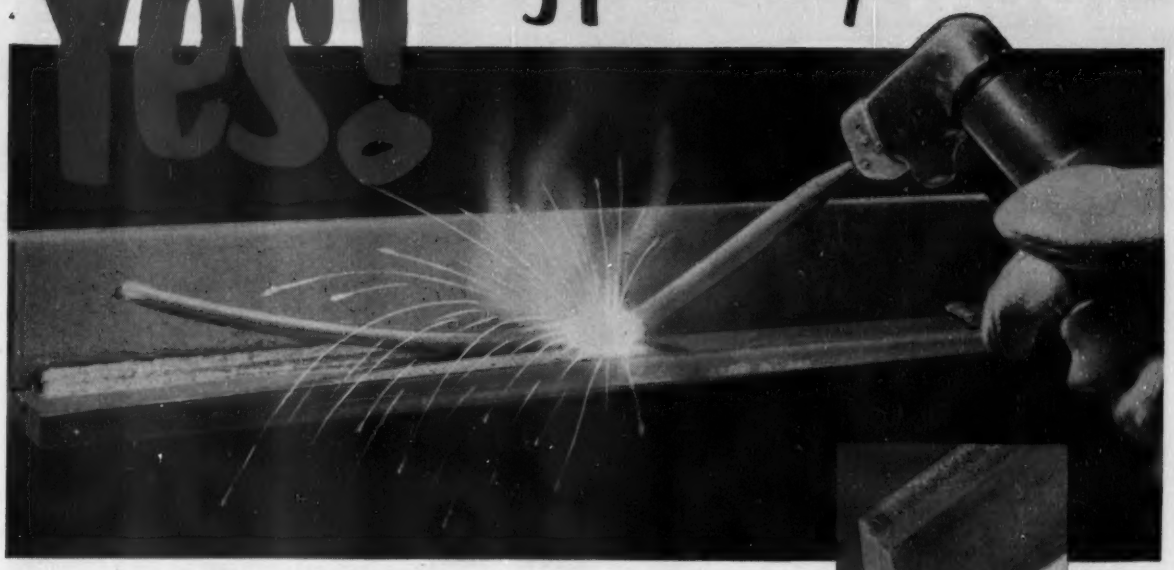
FIRE HAZARDS AND SAFEGUARDS FOR METALWORKING INDUSTRIES—*Published by The National Board of Fire Underwriters, 85 John St, New York 38, NY. 57 pages, 8½ x 11 in. Paper cover.*

Fire—man's most implacable enemy, yet his most useful servant — yearly takes a tremendous toll from American industry. In those industries dealing with commonly recognized flammable materials, the risks are readily apparent, and due precautions are taken. But in America's biggest industry, Metalworking, an industry that employs one worker out of every ten of the country's employables, there has been but scanty recognition of the dangers involved.

The old myth that "there is nothing here but iron and steel, and they won't burn," has been so thoroughly exploded by several recent conflagrations in metalworking plants that, even among laymen, it no longer deserves credence. It is the purpose, therefore, of this manual to show where the hazards exist, and to suggest ways in which they can be eliminated.

A tremendous amount of thought and research has gone into its preparation; it is profusely illustrated and eminently readable. Without a single

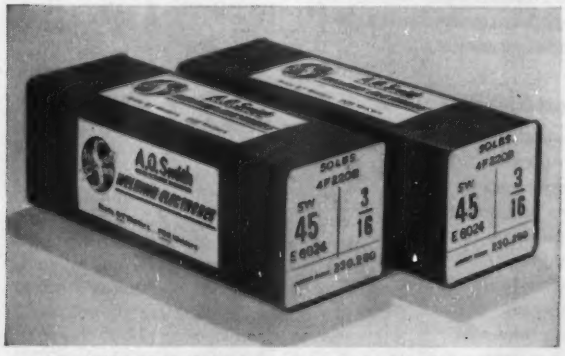
Yes! Slag peels as you weld!



Unretouched photo proves SW-44's fine ripples, good wash-up and complete absence of undercut.

New A. O. Smith SW-44 iron powder electrode offers outstanding speed, bead appearance

THROUGH RESEARCH . . . A BETTER WAY. Once again the A. O. Smith laboratories have advanced the ease and speed of welding. This time it's the SW-44 — a *perfected* iron powder electrode that's practically *self-cleaning.*



For AWS Class E-6020 work, A. O. Smith offers the job-proved SW-45 heavy-coated iron powder electrode. Here are high physicals and consistent x-ray quality plus fast deposition, good bead appearance, ease of cleaning. Like the SW-44, it's the high-speed answer for horizontal and down-hand fillet and groove welding.

Not only can you deposit far more E-6012 type of weld metal than with conventional electrodes — you *almost eliminate the job of cleaning.* What's more, bead appearance is outstanding — flawlessly smooth with fine ripples. It's as easy as squeezing tooth paste out of a tube. And re-striking is easy . . . even with a completely cooled rod.

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The simply designed, sturdily built **Plan-Gear Transmission** has been tested exhaustively and successfully in the field as well as in the laboratory, and has proved superior to other more complex transmissions. If you have need for a transmission with 150 pound-feet continuous input torque, we'd like to discuss the matter with you. Write today for further information.

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is rated at 150 pound-feet continuous input torque; self-lubricated, constant duty, for use with torque converter. Standard ratios: high, 1:1; low, 3:1; reverse, 3.2:1; optional reverse, 2.23:1.

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- Slushers
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"scare" line, it carefully points out where and how fire can start and spread, and gives dramatic proofs; then outlines the ways in which preventive measures can be applied.

All phases of Metalworking are covered, including casting, machining, heat treating, finishing, assembling, and packing, and data are presented on the fire and explosion characteristics of metals and metal dusts. This is a book which should be in the possession of every plant fire-prevention engineer and every company president. It deserves careful perusal, followed by immediate action.

•

TESTED APPROACHES TO CAPITAL EQUIPMENT REPLACEMENT—*a special report from the American Management Association, 330 W 42nd St, New York 36. 94 pages, 6 x 9 in. Paper. Price, $2.25; nonmembers, $3.25.*

This is the report of proceedings at the recent AMA conference on capital equipment replacement, in New York. Subject matter and contributors are the same as were presented at the conference.

The book is a valuable reference for those with capital replacement problems, because the contributors have been selected from widely varying industries. Unique problems from each industry are thus discussed.

Companies represented include National Gypsum, duPont, Sylvania, Standard Oil (NJ), Allis-Chalmers, Armstrong Cork, Bigelow-Sanford, and Atlantic Refining.

•

FIBERGLAS REINFORCED PLASTICS — *by Ralph Sonnenborn, Technical Services Dept, Plastics Reinforcement Div, Owens-Corning Fiberglas Corp; and contributing authors. Published by Reinhold Publishing Corp, 430 Park Ave, New York 22. 240 pages, 5½ x 8¾ in. Price, $4.50.*

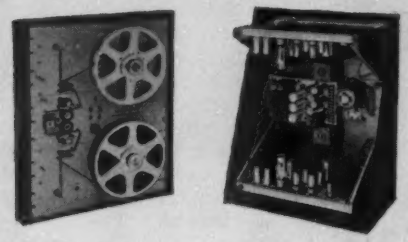
Glass-fiber reinforced plastics are steadily becoming more important in American production, and here is the book which tells what to do to make the most of the fact. Although information is lacking in some degree, what is known about the manufacture and properties of glass-fiber has been presented in great detail.

Subjects covered include materials, manufacturing methods, inspection and testing, properties, and design considerations.

Because the use of glass-fiber reinforcements must wait for enough knowledge of the products possible,

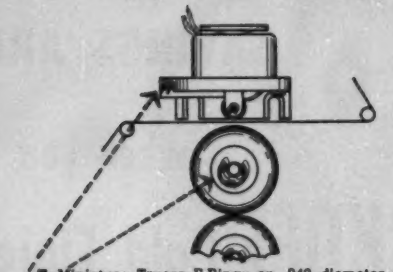
30 Waldes Truarc Rings Save Space and Time... Simplify Assembly and Disassembly

Potter's New Digital Magnetic Tape Handler



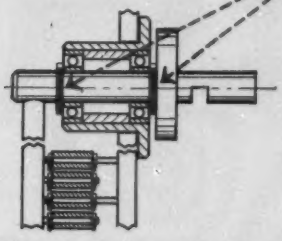
■ Prime requirements: fast starts, fast stops, fast tape speeds, great accuracy. Using Truarc rings, this new model starts and stops the tape within 5 milliseconds, has tape speeds up to 60 inches per second.

Solenoid Mount and Capstan Assembly



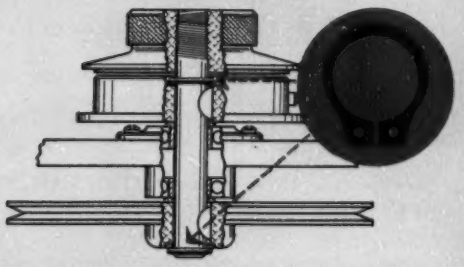
■ Miniature Truarc E-Rings on .040 diameter shaft and on continuously running capstans eliminate projecting bolts and screws. Rings permit rapid assembly and disassembly, fast replacement of worn rubber capstans.

Tension Shaft Assembly



■ Truarc E-Rings snap quickly into place, act as shoulders for the ball bearings with a minimum of friction. Additional Truarc Rings are used as spacers on shafts, can be located accurately to extremely close tolerances.

Reel Shaft Assembly



■ Truarc Standard Rings (Series 5100) hold the reel shaft assembly firmly in place and permit the use of quick-lock hubs so that the reel tapes can be changed in seconds as they are finished.

Potter Instrument Company, Inc., of Great Neck, L. I., uses 30 Waldes Truarc Retaining Rings in their new Model 902 High Speed Digital Magnetic Tape Handler. In addition to solving a variety of fastening problems, Truarc Rings facilitate the rapid acceleration and fast stopping needed in these machines.

Wherever you use machined shoulders, bolts, snap rings, cotter pins, there's a Waldes Truarc Retaining Ring designed to do a better, more economical job. Truarc Rings are precision engineered, quick and easy to assemble and disassemble. They save time and increase operating efficiency.

Find out what Waldes Truarc Retaining Rings can do for you, toward saving costs and improving your product. Send your blueprints to Waldes Truarc Engineers for individual attention without obligation.

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this book could be said to be a sort of forerunner of wider acceptance of the products described. Certainly there are not many producers today who get the full benefits of FRP (Fiberglas Reinforced Plastics). Learning what is told here will help along the wider adoption of these new materials.

It is stated, in a footnote at the beginning of the book, that Fiberglas is the reinforcing material under consideration. The footnote also implies that any other glass-fiber products are "made under license from Owens-Corning . . . ." This is misleading because "Fiberglas" is a trade name. There are some very good glass-fiber products (which are being used in reinforcements) made by other companies than by O-C or its licensees.

•

GEMEINFASSLICHE DARSTELLUNG DES EISENHUTTENWESENS (COMPREHENSIVE REPRESENTATION OF THE IRON AND STEEL INDUSTRY) 16TH EDITION — *Published 1954 by Stahleisen, Dusseldorf, Germany. 568 pages, 7 x 9¾ in. Price 38.50 DM.*

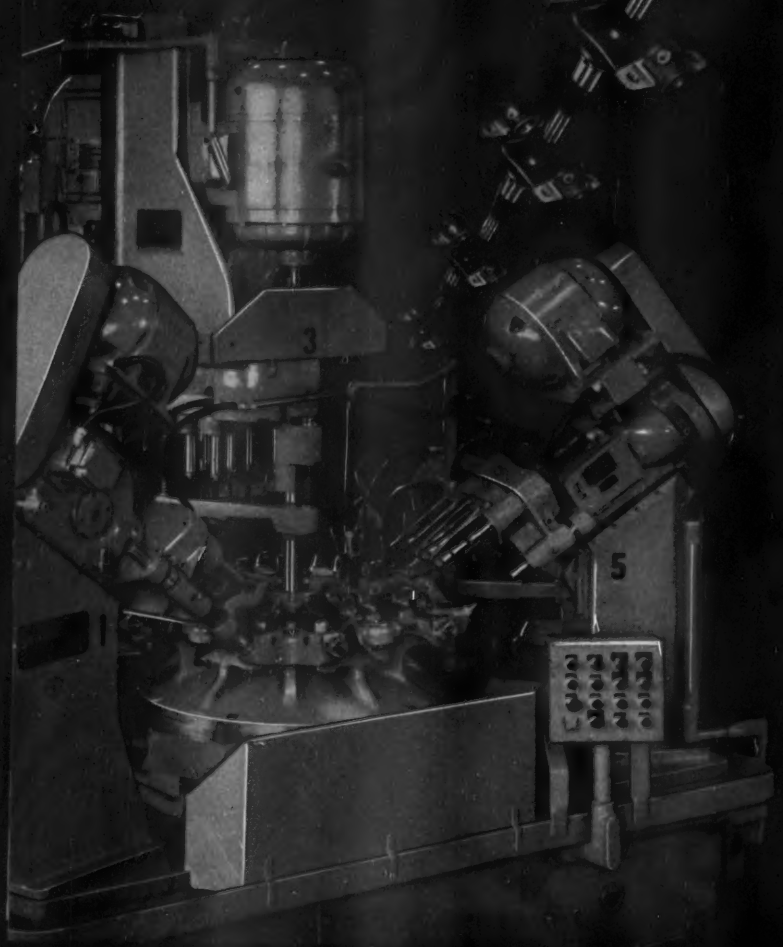
The fact that this book, which first appeared in 1889, has had 15 new editions speaks for its popularity in Germany. The first 244 pages may well be called the making, shaping, and treating of iron and steel, from the raw material to finished goods, such as nails and byproducts. The book is technical enough to be interesting, but contains no detailed engineering information.

The first section is claimed to represent the information that an engineering student should have acquired at graduation. A chronicle of iron and steel from 4000 BC to 1940 AD is offered. According to this, all progress since 1901 took place in Germany and no progress worth mentioning was made since 1940.

The second section contains 150 pages of statistics on ore deposits, coal deposits, and steel production in every country for which information is available. The data on USSR and China are very interesting. The last 177 pages deal with the history and economics of the German iron and steel industry.

The statistics on wages and prices in other countries should be of interest to importers and exporters of iron and steel. And the recent history in Germany concerns managers and union leaders who are interested in finding out how the system of having a union man on the board of directors has worked out. — *Reviewed by W Trinks.*

When it comes to production



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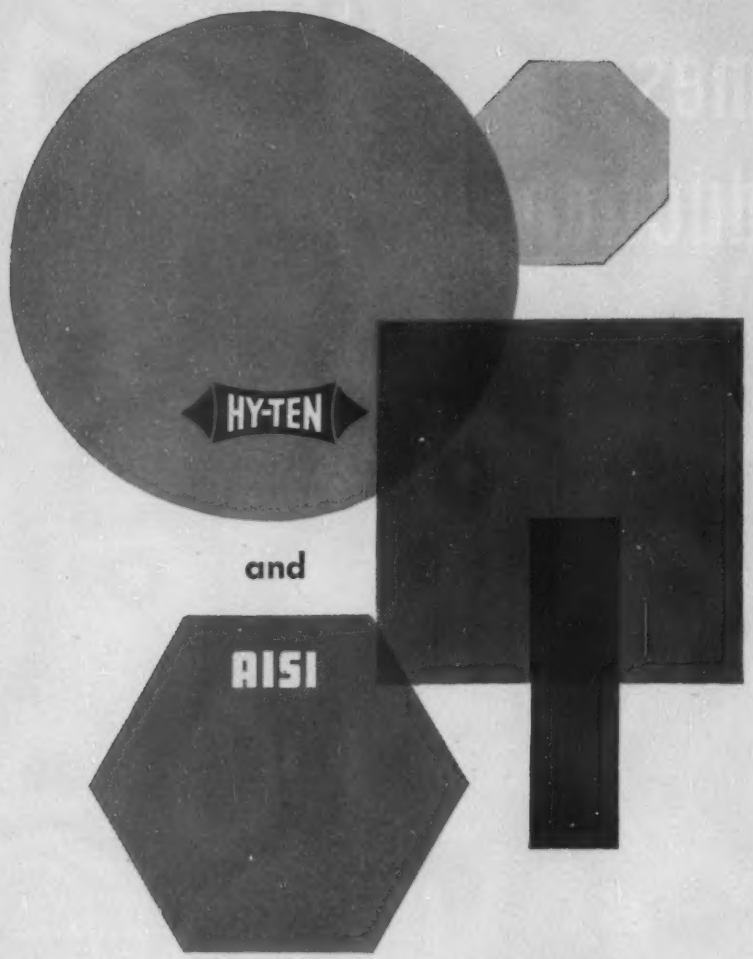

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Names in the News . . .

Herman L Weckler has been elected general manager of Clevite Corp, Cleveland, which he joined last year as vice president, operations. For thirteen years prior to that time he had been vice president and general manager of Chrysler Corp. In his new post Mr Weckler will have general responsibilities in all Clevite activities, including the corporation's central staff, and its research and development units.

S A Girard has been appointed general manager in charge of Kaiser-Willys Toledo automotive operations. Mr Girard, a Kaiser Motors vice president since 1951, and a vice president of Willys Motors since April 1953, has been executive assistant to Mr Kaiser for the past year. His appointment fills a post vacant since the resignation last spring of **Raymond R Rausch.**

William G Shepard has been appointed general sales manager for the Ohio Injector Co, Wadsworth, Ohio, producers of industrial valves. A member of the firm since 1945, Mr Shepard has been district sales representative, and has worked in the company's home office sales department at Wadsworth. He moves into his new post from the Chicago office, where he was division sales manager.

George S Smith has been appointed director of engineering and a vice president of the Johns-Manville Products Corp; he succeeds **C B Burnett,** who has been promoted to other executive responsibilities. **Arthur C Smith** has been named chief plant engineer in the general engineering department, and **Donald E Hillier** succeeds him as production engineer of the J-M Building Products Div.

Forrest F Hinkley has been appointed general manager of Aero-Coupling Corp, Burbank, Calif, subsidiary of Aeroquip Corp of Jackson, Mich. Mr Hinkley joined the organization as assistant factory superintendent in 1943; he has held successively the posts of production manager, director of materials, and director of subsidiary operations at the Jackson plant.

Edward R Maddock has been appointed works manager of Worthington Corp's Decatur, Alabama, works which started operations this

IT'S OK WHEN YOU FOLLOW THE LEADERS

The automotive industry stands as a leader in technological advancement and cost-cutting production techniques. That's why today practically every important automobile manufacturer is using Ohio Knife Aluminum Bronze Wear Plates on body dies.

By a unique cladding process, long-wearing aluminum bronze is bonded to a machinable steel base. Cost is drastically lower when compared to solid cast bronze plates. A finer quality bearing surface is obtained, resulting in longer life. When fitting is required to suit die, steel backing of plate is easily machinable, and no difficulty is encountered drilling or counter boring through bronze surface. OK aluminum bronze plates are applicable wherever a die has a sliding or cam action. A large selection of OK aluminum bronze plates carried in stock . . . finished ground, flat and parallel . . . ready to ship. Specials made to your specifications. Literature available showing our standard sizes. Write Dept. 29-W.

Manufacturers for the metalworking industry of:

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Cuts through 1½" cold rolled steel in 41 secs.! That's 15 times faster than a hand hack saw . . . 2½ times faster than larger power hack saws!

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• In tight, awkward spots like this, Porta-Band delivers smooth, controlled sawing in any position—eliminates fatigue—cuts costs.

• Take Porta-Band anywhere—around the plant, in stock bins, to equipment yards, out in the field. Portable, compact, light—perfect for general maintenance or teardowns.

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year. Mr Maddock joined the company in 1936 as a test engineer. He was made manager of research and development in .1948, manager of maintenance in 1952, and last year was appointed product manager of condensers, heaters, and ejectors. He succeeds **George P Passmore,** who resumes his duties as assistant to the vice president in charge of manufacturing.

Robert L Earle has joined Marquardt Aircraft Co, Van Nuys, Calif, as vice president, administration, and assistant to the president. He was associated with Curtiss-Wright Corp for 21 years, and was senior vice president in charge of all aeronautical divisions when he resigned in 1950 to form his own electronics company.

W F Slater has been named general sales manager of Kobe, Inc, Huntington Park, Calif. **R G Ralph** has been appointed hydraulic service manager; **Ray Elner,** hydraulic sales manager; and **J T Lewis,** southern division sales manager.

Rex D Brookhart has been appointed sales manager of plastics tooling materials for Furane Plastics, Los Angeles. Mr Brookhart was formerly in charge of plastics sales and tool development at Wal-Mar Plastics, Los Angeles.

Dr Ernst H Krause, nuclear physicist and specialist in upper atmosphere science, has been appointed to head new research laboratories being planned at the Missile Systems Div of Lockheed Aircraft Corp, Van Nuys, Calif. He resigned his post as associate director of research at the Naval Research Laboratory, Washington.

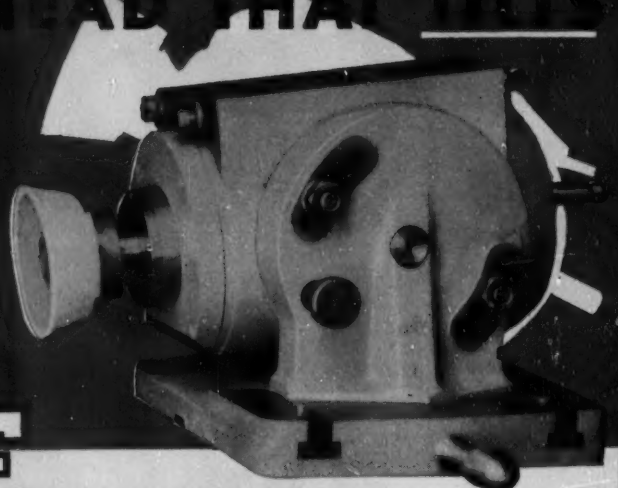
Donald E Flinn has been assigned to head Aero Engineering Co's new sales office in St Louis, Mo. He was formerly connected with the company's Indiana office.

A W Morgan, formerly executive vice president and general manager of Pachmayr Gun Works, Los Angeles, has joined Convair-San Diego as assistant to the manager.

Robert W Ertle has been named superintendent of production at Timken Roller Bearing Co's Canton, Ohio, factory. He moves up from his post as assistant superintendent. **Kenneth R Adair,** former assistant superintendent in charge of bearing factory maintenance, has been pro-

HERE'S A HEAD THAT TILTS

and Yours Will Nod, Too When You See What You Can Do With This One



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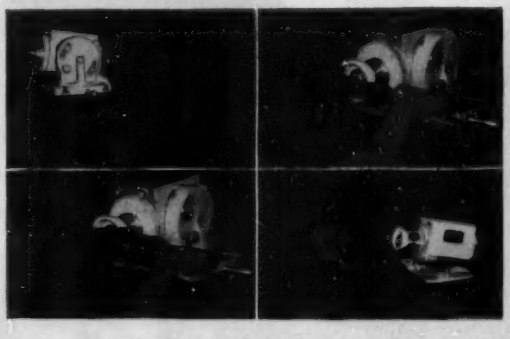
With ... In A Vertical Plane

Give this versatile head the nod and save time and money these seven ways:

1. You can use cup wheels for practically all clearance angles and thus produce a cutting edge on tools that lasts longer because it is stronger.
2. You can keep the tooth rest on the center line of the cutter for practically all grinding on centers or in the work head.
3. You can grind most cutters and reamers all over *with a single set-up* using the swivelling table and Pope tilting head.
4. You can read all clearance angles directly in degrees from the scale provided on the head. No more mistakes.
5. You can get the right clearance angle on such tough grinding jobs as slab mills, taper reamers, angular cutters and form tools.
6. You have one safe speed — 3600 RPM — for all wheels generally used on cutter grinders. Heat checking of cutters is virtually eliminated.
7. You have a head that's so easy to adjust and use it saves you time and money every time you grind a tool.



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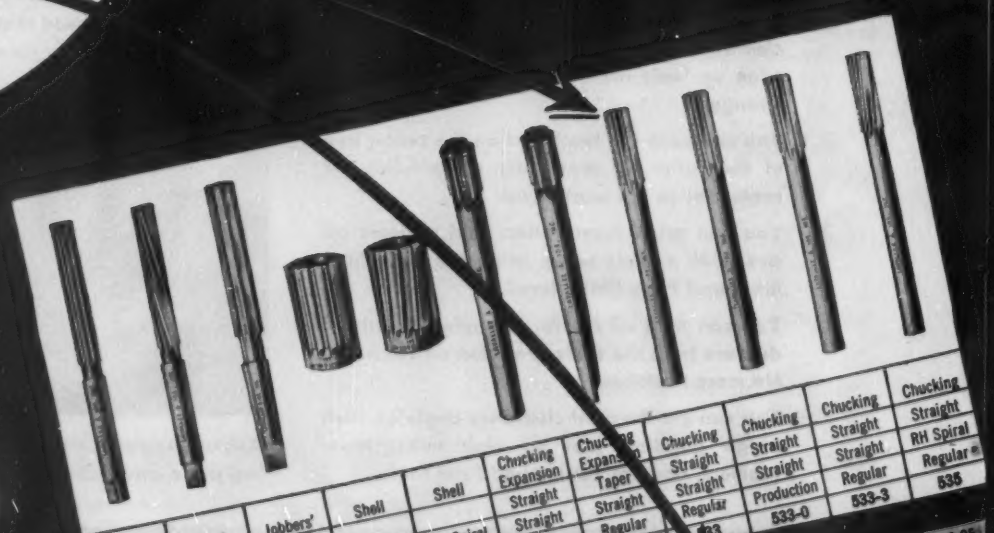

TYPE	Hand	Hand	Jobbers'	Shell	Shell	Chucking Expansion	Chucking Expansion	Chucking	Chucking	Chucking	Chucking
SHANK	Straight	Straight	Taper	Straight		Straight	Taper	Straight	Straight	Straight	Straight
FLUTE	Straight	LH Spiral	Straight		RH Spiral	Straight	Straight	Straight	Straight	Straight	RH Spiral
LENGTH	Regular	Regular	Regular	521	524	Regular	Regular	Regular	Production	Regular	Regular
LISTED	500	503	506			531	532	533	533-0	533-3	535
DIAMETER	NET PRICE EACH										
.4218	27/64"							2.58	2.46		2.85
.4375										2.85	
.4385						5.01	5.84	2.58	2.46		
.4395				4.81	4.81					2.85	
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2 - New line of Spiral Flute Reamers with both ***right*** and ***left*** hand spiral standard.

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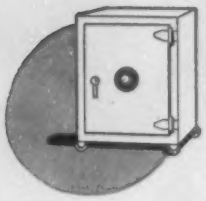

Everyone knows this
is a sign of security . . .

And smart gear users know
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May We Send You Our Brochure?

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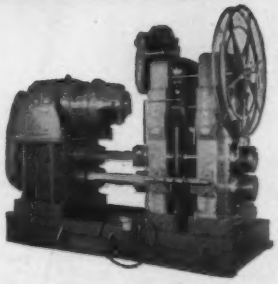
THE CINCINNATI GEAR CO. • CINCINNATI 27, OHIO

THERE'S NO SUBSTITUTE FOR KNOW HOW

Your
RUTHMAN
GUSHER
COOLANT PUMPS
give you



Illustrated is a Fenn No. 121 Two High Roller Bearing Rolling Mill equipped with a Model 5-P3 Long Gusher Coolant Pump.

1 ***Experience in Design*** . . . Ruthman Gusher Coolant Pumps were first in their field and have maintained their leadership over the years. Ruthman engineers are constantly at work to bring you an even better Gusher Pump.

2 ***Precision Built.*** Only tested materials and the best workmanship go into your Gusher Coolant Pumps. You can be sure of a long trouble-free life.

3 ***Efficient Operation*** is inherent in Gusher Pumps. You get split-second coolant flow and they require no priming or packing.

Always Specify Ruthman Gusher Coolant Pumps.

THE RUTHMAN MACHINERY CO.
1818 Reading Road Cincinnati, Ohio

moted to superintendent of maintenance at the Canton and Gambrinus factories. **Robert L. Sisson** has been named assistant superintendent at Gambrinus, and **Donald W Skelly** has been named general foreman of Dept 64.

E C Graves, superintendent of fabricating for General Electric Co's Carboloy Dept, has been made superintendent of product manufacturing at the department's Detroit plant.

Andrew Liston has been appointed general sales manager of the Eddystone Div of Baldwin-Lima-Hamilton Corp, Philadelphia. He was formerly manager of industrial sales, and has been associated with Baldwin since 1931.

Joseph P Costigan, formerly operations manager of Alloy Rods Co of York, Pa, has been named works manager of American Machine & Foundry Co's Buffalo plant.

M L Backstrom has been promoted to assistant sales manager of Firth Sterling's Carbide Div. He is succeeded in his former post of chief engineer by **W E Montgomery. John Gabrenas** has been named assistant chief engineer.

Carl W Larrick has been appointed works manager of the Morris Machine Tool Co, Cincinnati. He has been with the company for the past four years, and moves up from his post as production control manager.

A L Coulson has been appointed assistant sales manager of the Ford Instrument Co, Division of the Sperry Corp, New York. He has been a member of the organization for the past four years.

William C McDuffie has been elected chairman of the board of Northrop Aircraft, Hawthorne, Calif. A member of the board since 1943, Mr. McDuffie succeeds **Oliver P Echols** who died in June.

E H Stau has joined the Olympic Screw & Rivet Corp, Downey, Calif, as vice president and director of sales. Mr Stau was formerly sales manager for aircraft, Cherry Rivet Div, Townsend Co.

J E Sewell has been named general sales manager of the Garlock Packing Co, Palmyra, NY. He will direct sales through the company's 29 divisional offices throughout the

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in COLD FINISHED
BAR STEEL

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J&L DISTRIBUTOR

You reduce inventory costs in:

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SERIES "A" AIR CYLINDERS

Made in 11 bore sizes from 1½" to 14"... 13 standard mountings... many combinations. Extremely close tolerances insure accurate, easy mounting. Steel heads. Cylinders of hard-drawn, high strength brass honed to a satin finish. Piston rods ground and polished then hard chrome plated for extreme smoothness as well as corrosion resistance.

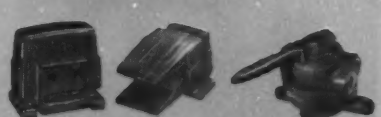
TYPICAL MOUNTING STYLES

WRITE FOR BULLETIN 213

Just off the press. The easiest catalog to use in the cylinder business. Write today.

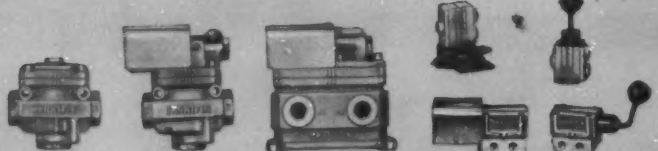
HANNIFIN AIR CONTROLS

Hannifin has the most complete line of air control valves. Exclusive designs, many types, for hand, foot, cam or solenoid control of air cylinders, presses, and other air-operated equipment. Ask for recommendations.



DISC-TYPE VALVES

Bronze discs lapped to perfect seal with seats. Packless design. For hand, foot or electrical operation.



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The P-M line provides faster, easier operation for the simplest to the most complicated air-operated circuit. 2-Way, 3-Way and 4-Way Master Valves and Solenoid Pilot-Master Valves... also direct operated 2-Way and 4-Way valves with a wide choice of operating heads.

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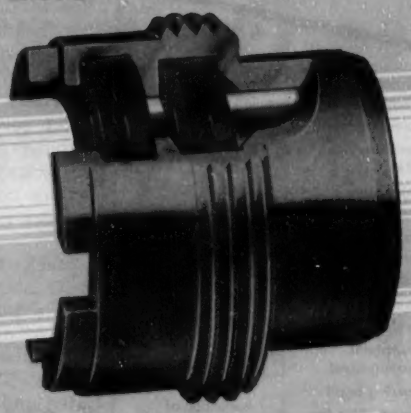
Air and Hydraulic Cylinders • Hydraulic Power Units • Pneumatic and Hydraulic Presses • Air Control Valves

TYPE CYLINDERS

BOTH WITH NEW, CARTRIDGE GLAND

...externally removable and replaceable without dismantling cylinder!



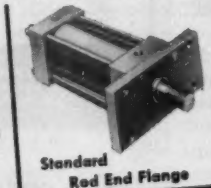
Here's the biggest improvement in cylinder design in the last 50 years. This exclusive Hannifin gland is a bronze cartridge, externally removable and replaceable as a unit to meet J.I.C. recommendations. A face type spanner wrench is the only tool you need. Now look at the packing! The "Wiperseal" serves a dual purpose as it wipes both ways to provide a dry rod on the out-stroke, a dirt-free rod on the in-stroke. The "Lipseal" is self-compensating, self-relieving and non-adjustable... provides an efficient seal throughout its long life. Ask for a demonstration... every Hannifin man carries a cutaway sample of this "jewel" of a gland with him at all times.

SERIES "H" HYDRAULIC CYLINDERS

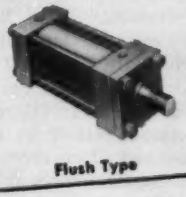
Made in 9 bore sizes from 1½" to 8"... 13 standard mountings... many combination mountings. Extremely close tolerances for easy mounting. Heavy-duty tie rods. Steel heads. Steel cylinder bodies "Tru-Bored" and honed to a satin finish. Piston rods ground and polished then hard chrome plated for minimum friction and long packing life.

TYPICAL MOUNTING STYLES

Clevis Mounted



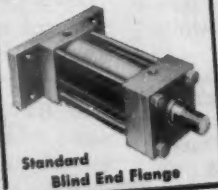
Standard Rod End Flange



Flush Type

Side Lugs

Heavy Duty Blind End Flange



Standard Blind End Flange

Trunnions at Rod End

Angle Mounted

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FINISHING
PROBLEMS
are yours?

CHECK*

- ☐ Lubrication retention
- ☐ Soldering bond
- ☐ Decorative effects
- ☐ Paint adhesion
- ☐ Plating bond
- ☐ Anodized film adherance
- ☐ Satin finishes
- ☐ Instant wetability
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- ☐ Brazing bond
- ☐ Preparation for non-destructive testing
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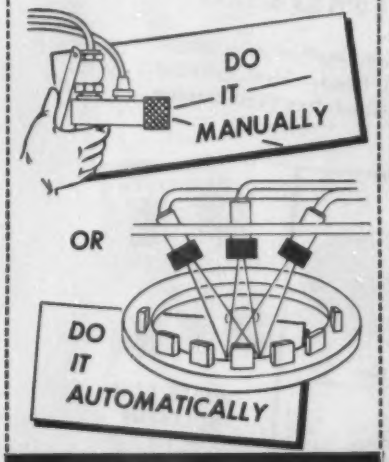
- ☐ Stress relief
- ☐ Vinyl coating bond
- ☐ Ceramic coating bond
- ☐ Smoother surfaces
- ☐ Etching
  - ☐ Plastic
  - ☐ Metal
  - ☐ Glass
- ☐ Elimination of galling
- ☐ Reduction of friction
- ☐ Visual inspection



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WET BLASTING
TWO SPEED

This ad is your coupon. Check off your problem(s) an'l mail today for free illustrated literature . . . application data . . . case history information!

THE CRO-PLATE COMPANY INC.
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US and Canada. Mr Sewell joined the firm in 1935 as salesman for the Montreal area. He was appointed vice president of the Garlock Packing Co of Canada, Ltd, in 1947. He takes over the duties of **Louis Mohn,** a vice president of the company, on sick leave.

Henry W Koester, service representative for Giddings & Lewis Machine Tool Co, Fond du Lac, Wis, has been transferred from the home office to Los Angeles, which will be his headquarters for servicing of G & L equipment of the West Coast.

Wilson L Young has been named chief service engineer for Colonial Broach Co. Mr Young has been with the organization for four years, and moves up from his post as assistant service manager.

Jack Bolte, formerly associated with Standard Products Co, is opening a plant in Port Clinton, Ohio, for production of steel and aluminum stampings for the automotive trade. The business will be operated under the name **Bolte Products** in the Harry Stensen Bldg.

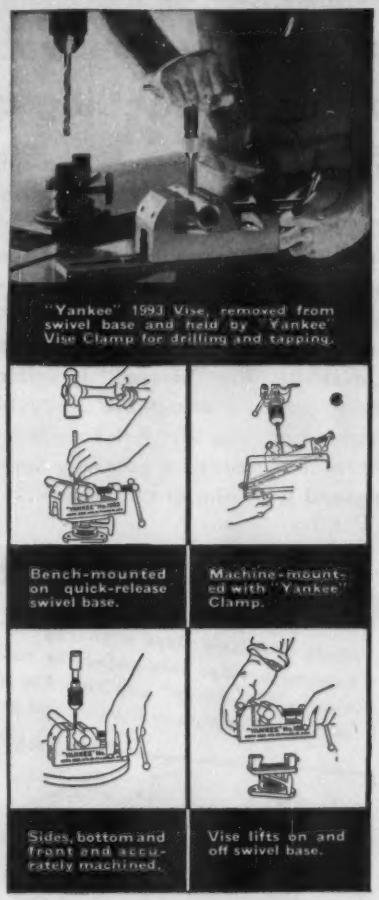
Nationalized British Engineering (How It Doesn't Work)

IN BRITISH INDUSTRY TODAY, production executives have had a fair sample of the results of engineering under nationalization. It is certainly not an encouraging picture. Because of the curious workings of the "liberal" system, we have reached a state of affairs in which the slow and inefficient worker is bolstered up, while the highly skilled, high-output employee is hounded out of his job for working too hard. Two recent happenings provide an excellent example of this. These examples are not unique, but are, unfortunately, commonplace. Both took place within one week, at nearby factories.

At one factory, a new worker, a young man, was given a week's notice for being, in the opinion of his foreman, much too slow and inaccurate. At the other plant, a new man, middle-aged and thoroughly experienced, had to quit his job because he was, in the opinion of shop stewards, much too fast.

In the case of the younger man, management did everything possible to preserve his record from the stigma of failure. The reason given for discharge was "lack of suitable work," that, is work within his ability. The young man good-naturedly

SPEED UP
SMALL JOBS with
"YANKEE" VISES


"Yankee" 1993 Vise, removed from swivel base and held by "Yankee" Vise Clamp for drilling and tapping.
Bench-mounted on quick-release swivel base.
Machine-mounted with "Yankee" Clamp.
Sides, bottom and front and accurately machined.
Vise lifts on and off swivel base.

Line up small work just once in a "Yankee" Vise for a whole series of hand and machine operations. Four sizes . . . 1½", 2", 2¾" and 4" jaw widths . . . with and without swivel base. Hardened steel "V" block for round stock. Your industrial distributor has a full stock.

Write for The "YANKEE" Tool Book

"Yankee" Tools now part of
STANLEY
THE TOOL BOX OF THE WORLD

NORTH BROS. MFG. CO.
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Performance Proves

20% to 90%

LESS VIBRATION

with Veelos—the Balanced V-belt

Engineers have long known that there are four principal causes of machine vibration: 1. bearings; 2. motor; 3. clutch; 4. sheaves. Often overlooked is a fifth cause: v-belts. And, in many instances, *v-belts alone* are the major cause of vibration.

There's a logical reason for this.

Regular v-belts have spots of varying density due to their construction. Normally, these spots are not apparent, yet they throw the belt out of balance when the drive is operating. As a result, vibration is created that can damage bearings, shafts and, most important, the finished work.

This is not true of Veelos v-belts.

Veelos is absolutely uniform throughout its entire length. Every link and every stud is identical. The smooth, machine-cut sides and the laminated construction assure smooth, vibrationless power delivery. Veelos is perfectly balanced.

In case after case, installation of Veelos v-belts has reduced machine vibration 20% to 90%.

Proof that Veelos will reduce vibration can easily be demonstrated with an electronic vibration analyser. This analyser measures amplitude of vibration to as low as 2-millionths of an inch.

Fifteen minutes of your time is all that is required to show you with the electronic analyser that Veelos creates less machine vibration. Drop us a line or clip the coupon for a demonstration.

VEELOS
THE LINK
V-BELT

Manheim Manufacturing & Belting Company
601 Manbel St., Manheim, Pa.

Yes, I would like a demonstration. **Have your representative call me for a convenient time.**

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Company.....

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ADJUSTABLE TO ANY LENGTH • ADAPTABLE TO ANY DRIVE

Veelos is known as Veelink outside the United States.

20V

Where PERFORMANCE

...and PRICE Meet!

Modern tool and cutter grinding demands top performance *and* economy.

BAY STATE'S new "8A" vitrified Bonded Wheels meet both these requirements.

FIRST

"8A" is a combination of specially selected and blended abrasives.

Result: Wheel cost is considerably lower, yet the all-important cutting characteristics of premium priced wheels are matched.

SECOND

The cutting action is fast, free, and cool . . . giving long useful life with minimum dressing.

This is one more illustration of "better grinding" engineered by BAY STATE in its outstanding "Wheels of Progress" program.

Send for latest brochure giving tool grinding specifications.

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Manufacturers of all types of Quality Abrasive Products

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154 ideas on ways to use...

154 varied applications of molybdenum sulfide in the shop and in the field are described in a new booklet now available. This solid-film lubricant has demonstrated unique anti-friction properties under conditions of extreme pressure, high velocity, elevated temperature, or chemical attack.

The 40-page booklet contains the records of solved lubrication problems — some might solve your own. Fill in the coupon below, attach it to your letterhead and send it off today.

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MOLY

AM10

admitted he could not make the grade on high-accuracy work, and having been hired on trial, readily accepted the week's notice. Not so with the shop stewards, though. They were soon on the track, insinuating the young man had been unjustly treated, etc, etc, and seeking, in an interview with management, to have the notice withdrawn. When asked if they really supported the idea of keeping obviously unsuitable people, the stewards indignantly replied "no," but the man should have been told by his foreman that he was too slow. This didn't make much sense, because the man in question had been working at piece rates alongside others doing the same work, and could see that his own time to do a job was about three times as much as that of those around him.

Finally, the subject of the deadlocked negotiations told his foreman that in the interval, he had gotten another job, and was leaving of his own accord.

At another factory, the older engineer was given a job at fixed bonus rate. The average earned bonus in the shop was about 75%, but the newcomer, in his first 44 hours, made about 375%. Although he was not a union member, he had applied for membership in the usual channels. In due course, he was advised that his application had been turned down. The reason? He had previously been a union member, but, on starting a small business of his own, had allowed his membership to lapse. As he continued to raid the bonus pool every week, the shop stewards became restive, and finally staged a strike—not, of course, because the man was earning 375% bonus, but rather because he was non-union. The fact that the man had applied for membership was ignored, as was the fact that he had previously been a full-fledged member of the union. For the offense of resigning from the union when he started his own shop, he was not to be allowed to rejoin. When the 2000 men put their tools down and went out on strike, the man left the job of his own accord, rather than inflict a prolonged strike on those less able to afford it than he.

This melancholy tale could be told in many nationalized industries. What England is getting for the highest wages ever is lower production from each worker, and increased strikes and slowdowns, particularly among the younger men. One fact emerges form this welter of muddle and defeat—rank and file worked better and harder under the capitalist boss than under any of several National Boards.

M DONALD
Airdrie, Scotland

Stronger Bond for Laminated Plastics

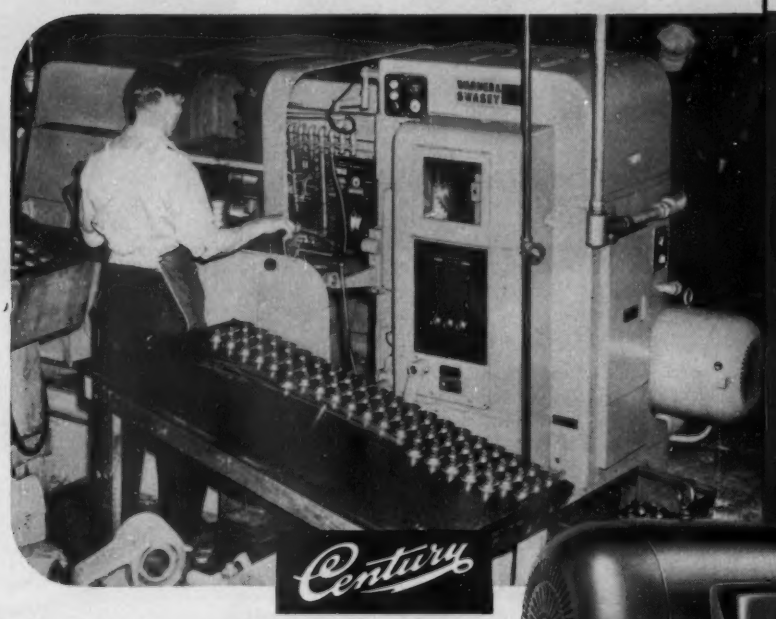
A SERIES OF CHEMICAL finishes that improve the bond between glass fibers and the impregnating plastic has been developed by the Naval Ordnance Laboratory at Silver Spring, Md. These Chlorosilane compounds react with the glass fiber to become a part of the surface, then react with the plastic resin. There is less chance that vibration or flexing will separate and stronger laminates result.

As described at a recent meeting of the American Chemical Society, the five compounds have been tested with the three commonly used resins: polyester, epoxy, and phenolic. Two of the compounds were effective with all three resins, the others with one or two of them.

"Could we make a deal whereas you will turn out five drive shafts and two table lamps?"

Century

JOB MATCHED MOTOR . . . helps get



PRODUCTION OUT FAST . . .

ON 5-SPINDLE AUTOMATIC CHUCKING MACHINE

Performance Rated® MOTORS

Type TEFC, Totally Enclosed Fan Cooled Motor — protects against dust, mist, oil fog and fumes.

The Century Motor was selected with the proper torques — speed — adaptable mounting—frame protection for oil fume atmosphere. All the factors were Performance Rated to functionally match this specific application.

Century Motors are widely known in the metal working industry for their mechanical precision and unusual freedom from vibration—matching the fine equipment they drive.

Century Performance Rating is available to you because of the wide range of specifications from which to select. Motors are offered in A. C. or D. C.—⅛ to 400 H.P.—constant speed or speed control in fine steps.

Specify Century **Performance Rated** MOTORS for your equipment. Call a Century District Sales Office or your nearest Century Authorized Distributor.

CENTURY ELECTRIC COMPANY

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Century C MOTORS

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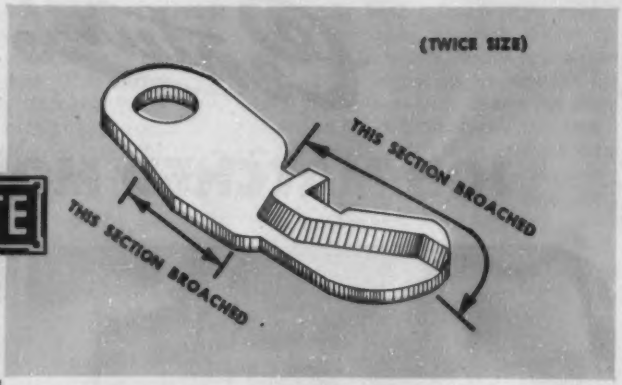
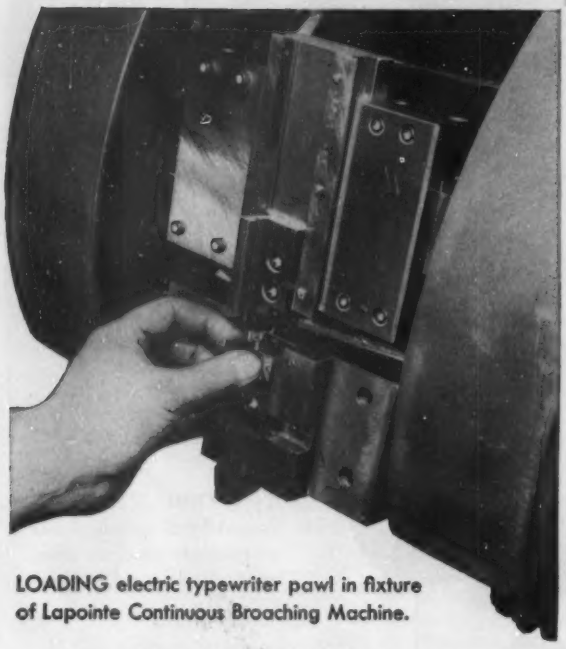
here's a good example of what can be done by LAPOINTE CONTINUOUS BROACHING





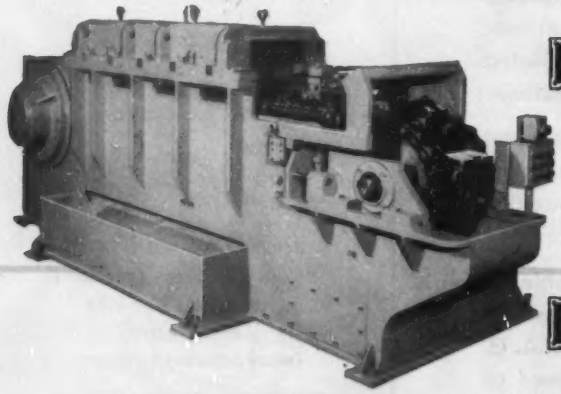
LOADING electric typewriter pawl in fixture of Lapointe Continuous Broaching Machine.

electric typewriter pawl

Contours broached on opposite sides simultaneously, leaving *machined surfaces* of fine finish . . . and to precision tolerances . . . *at a production rate of 800 and more per hour!* This is high production for so small a part, so awkward to load.

THINK of the parts, small or large, that you may now be machining by less economical methods. Then send for the new Lapointe **Bulletin CH-2** and learn more about the superior features of the Lapointe Continuous Broaching Machine. Here are a few:

- Massive, sturdy construction.
- Extra rigidity results in remarkably smooth operation, with no evidence of vibration.
- Full electric interlock instantly stops machine if parts are improperly loaded or clamped.
- Shear pin will sever and protect tools if undue strain develops, or if any other evidence of malfunctioning appears. (Pin is easily accessible, on outside of machine.)
- Drive sprockets are made in pie-shaped segments, removable one at a time, making complete replacement possible — if necessary — without removing drive chain or fixtures from the machine.



LAPOINTE **CONTINUOUS BROACHING MACHINE**
Available in 4 standard sizes
10 hp. 42-inch stroke
20 hp. 66-inch stroke
30 hp. 90-inch stroke
40 hp. 120-inch stroke
Any desired combination of horsepower, stroke, and speed can be obtained.

LAPOINTE **BUILDS THE MACHINE**
BUILDS THE FIXTURES
AND MAKES THE TOOLS
Lapointe takes *all* the responsibility for your **CONTINUOUS BROACHING** program!

THE LAPOINTE MACHINE TOOL COMPANY

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THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

NAME IT . . . AO HAS IT!

Comfortable AO F9200 Series

SAFETY GLASSES

with choice of 4 Temple Styles

Now, with AO's popular line of acetate spectacle safety glasses, workers can have any of four types of temples. These are: (1) Comfort Cable (easily adjustable), (2) Skull Type (extra strong), (3) Solid Core Riding Bow (moisture proof), (4) Spatula (broad flat tip for comfort fit).

These safety glasses are widely used, both with and without side shields, throughout industry for protection against flying particles. They are indispensable where spark hazards exist as in electronic work and spot welding...ask your nearest AO Safety Products Representative.

QUICK FACTS

LENSES — 6 Curve Super Armorplate clear or Calobar in medium, dark or extra dark shades, or 6 Curve Plastolite Lenses. Super Armorplate Lenses can be ground to worker's prescription.

UNOBSTRUCTED VISION — Note hinges and temples out of line of sight

KEYHOLE BRIDGE — Strong, lightweight

ORBIT-SHAPED LENSES — Conform to and cover eye orbit

COMFORTABLE NOSE PADS — Spread goggle weight broadly*

SIDE SHIELDS — Perforated for ventilation and lens fog control

*FX9200 model furnished with adjustable nose pads for hard-to-fit workers.

American Optical
SAFETY PRODUCTS DIVISION

AO SAFETY ZONE

Keep your workers in the Safety Zone with American Optical Safety Equipment

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hydraulic drive...a natural for

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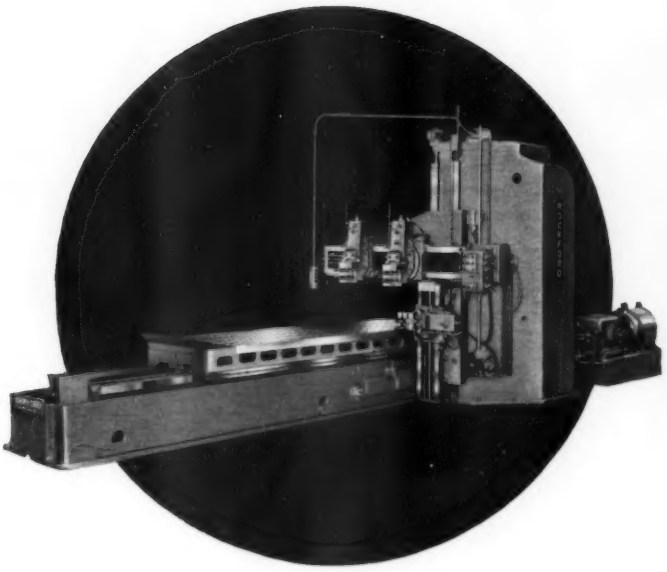
Rockford Machine Tool Co.

reciprocating machine tools

Hydraulic Drive and Feeds, as basic features in modern machine tool design, provide outstanding performance, measured in terms of work quality, high production and low operating cost. We have had over 25 years of experience in applying Hydraulic Drives and Feeds to Shapers, Planers and Slotters.



rockford hydraulic planers

Rockford Hydraulic Planers are designed and built for greater precision, heavier cuts and the use of new types of alloy and carbide cutting tools.

Table, bed and column are designed to withstand heavier cutting pressures. Column, with six-foot cross section and increased bearing on bed, assures accuracy,

Exclusive L-type cross-rail construction affords maximum bearing on column with resulting rigidity. Adjustable side-head rail assures accurate and permanent alignment of side head with rail heads.

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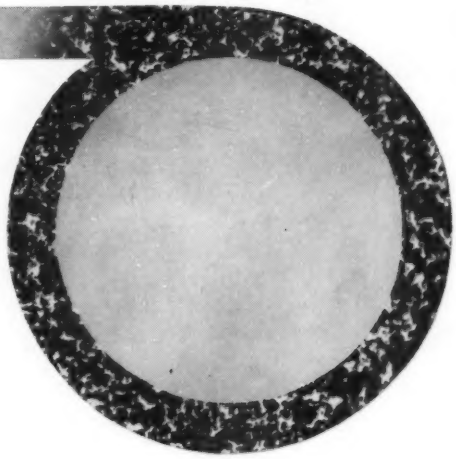
our 52nd year

Rockford, Illinois

Are your Alloy Steel Bars in the PROFIT AREA for your MACHINE TOOLS?



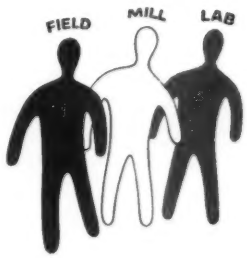
It's the outer rim of a Republic carbon-corrected alloy steel bar that helps you make a profit. In the ordinary heat-treated bar this is a "decarb" area that usually must be removed before parts can be made from stock. In a Republic bar, the carbon has been restored after heat treating . . . right out to the edge.

You don't machine away good metal into chips and shavings. And that can make a substantial difference in your profits.

Republic's 3-Dimension metallurgical service will be glad to show you how you can get in on such savings as these. It works with your metallurgists and production people to adapt cold-drawn carbon-corrected alloy steel bars to your product. The combined extensive experience and abilities of Republic Mill, Field and Laboratory metallurgists are added to the knowledge and skills of your engineers.

The result often means better products at reduced costs. Get in touch with your Republic Steel salesman. He can arrange for a Republic metallurgist to call at your convenience.

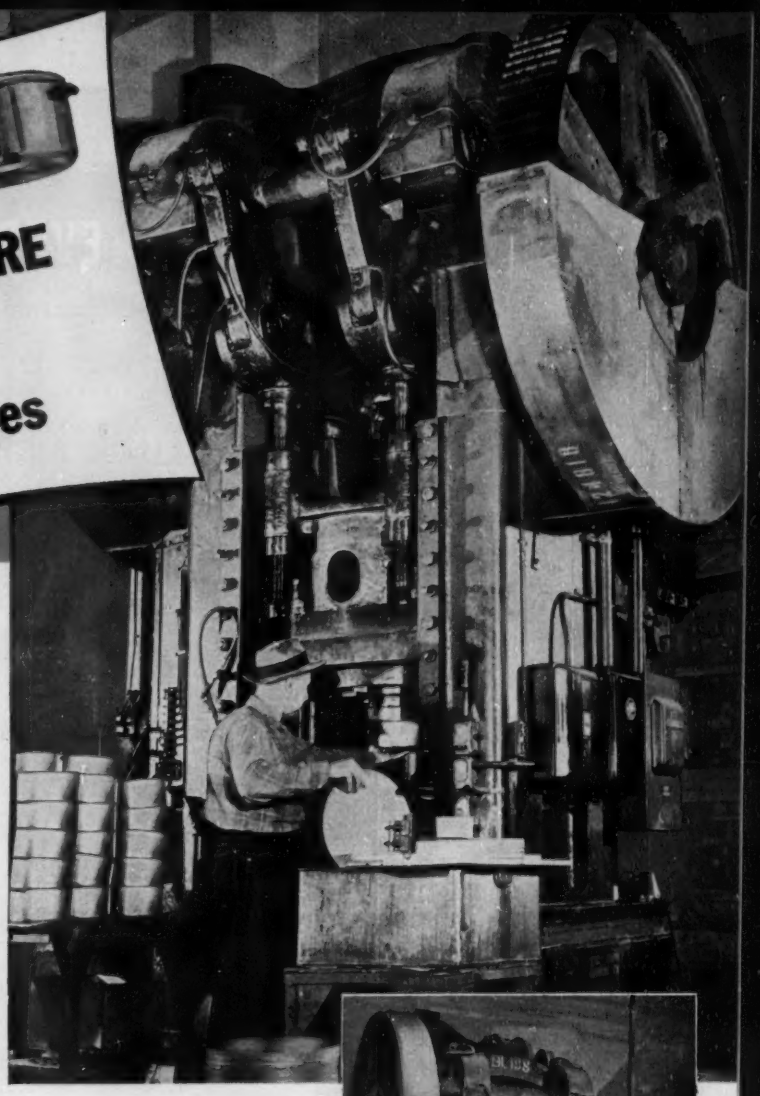
REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department; Chrysler Building, New York 17, New York



3-Dimension Metallurgical Service
combines the extensive experience and co-ordinated abilities of Republic's *Field, Mill* and *Laboratory* Metallurgists with the knowledge and skills of your own engineers. It has helped guide users of Alloy Steels in countless industries to the correct steel and its most efficient usage, IT CAN DO THE SAME FOR YOU.

REPUBLIC COLD DRAWN ALLOY STEEL BARS

Famous FARBERWARE is 100% BLISS in drawing presses



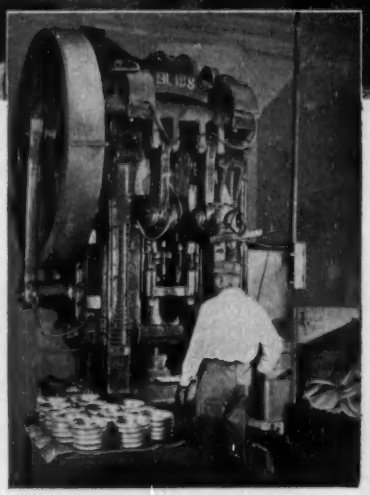
Famous Farberware begins with the finest stainless. And for dependable deep-drawing of stainless blanks, S. W. Farber, Inc. relies on Bliss toggle drawing presses—and has since 1917.

Today, the two Farberware plants are *100% Bliss* on drawing presses; *85% Bliss* on all other types.

Proven performance is the reason for this choice, of course. But here are a few of the specific operating advantages cited by H. M. Harrison, Vice President of S. W. Farber, Inc.:

1. Precision action delivers uniformly high-quality parts; keeps rejects at a minimum.
2. Bliss toggle presses are easy to set up, easy to change over; give trouble-free operation.
3. Maintenance requirements are nominal—adjustments are made quickly and easily when needed. (Floor level greasing system is a typical convenience.)

Perhaps Bliss toggle presses can solve your special deep-draw problems, too. But whatever your problems, if you're looking for high-quality, high-speed production in your press department, call a Bliss engineer. He will be glad to help you choose the *right* press for the job—mechanical or hydraulic—because Bliss makes them all.



1750 POTS IN EIGHT HOURS—that's the average production rate on this 5-S Bliss toggle. The four-quart pot is drawn 4½ inches deep in one operation from a 15-inch diameter blank of stainless.

SMOOTH BULGE on this pot cover makes it easy to clean—but calls for good press work. A rubber die is used with this 3½-B toggle press to perform this operation.

BLISS on your press is more than a name... it's a *guarantee*

E. W. BLISS COMPANY, Canton, Ohio

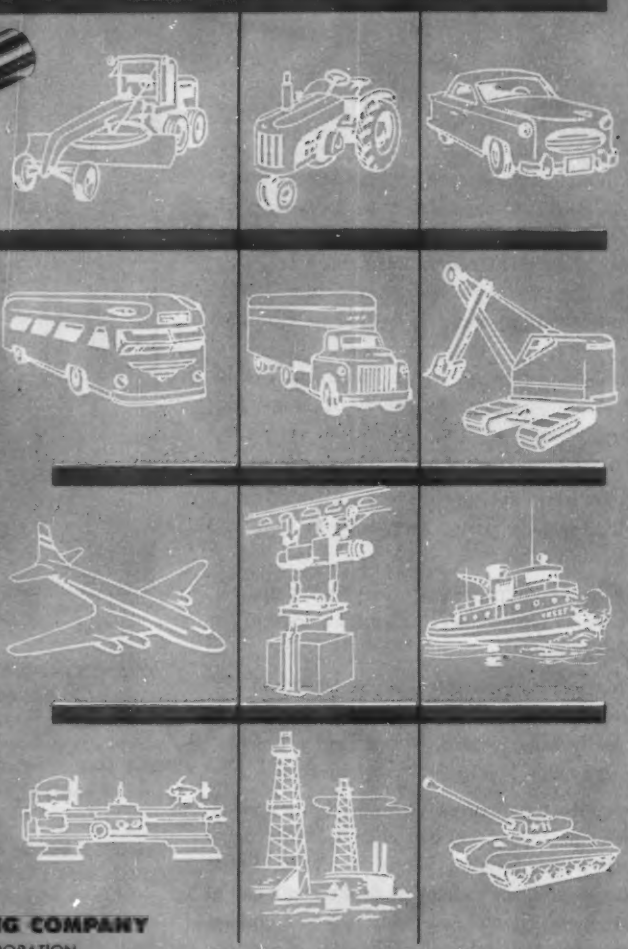
PRESSES, ROLLING MILLS, SPECIAL MACHINERY

E. W. Bliss (England) Ltd., Derby, England • E. W. Bliss Company (Paris), St. Ouen sur Seine, France

U. S. Plants in Canton, Salem and Toledo, Ohio; and Hastings, Michigan. *Branch Offices* in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo; and Toronto, Canada. *West Coast Representatives:* Moore Machinery Co., Los Angeles and San Francisco; Star Machinery Company, Seattle. *Other representatives throughout the world.*

EVERY DAY...EVERY WHERE

AETNA BEARINGS HELP EQUIPMENT DO A BETTER JOB



Deep within the equipment that keeps America running are functional assemblies subject to intense vibration, shock loads and constant wear. To provide protection and smooth, trouble-free performance for these assemblies Aetna engineers have teamed with both equipment builders and their suppliers to achieve simplified end product design, higher anti-friction efficiency and lower production and maintenance costs. The results of this cooperative teamwork are written into the success records of the World's finest equipment. Perhaps you, too, can use Aetna's forward-thinking engineering teamwork to good advantage. It costs nothing to find out. Write—

AETNA BALL AND ROLLER BEARING COMPANY
DIVISION OF PARKERSBURG-AETNA CORPORATION
4600 Schubert Avenue • Chicago 39, Illinois

Aetna

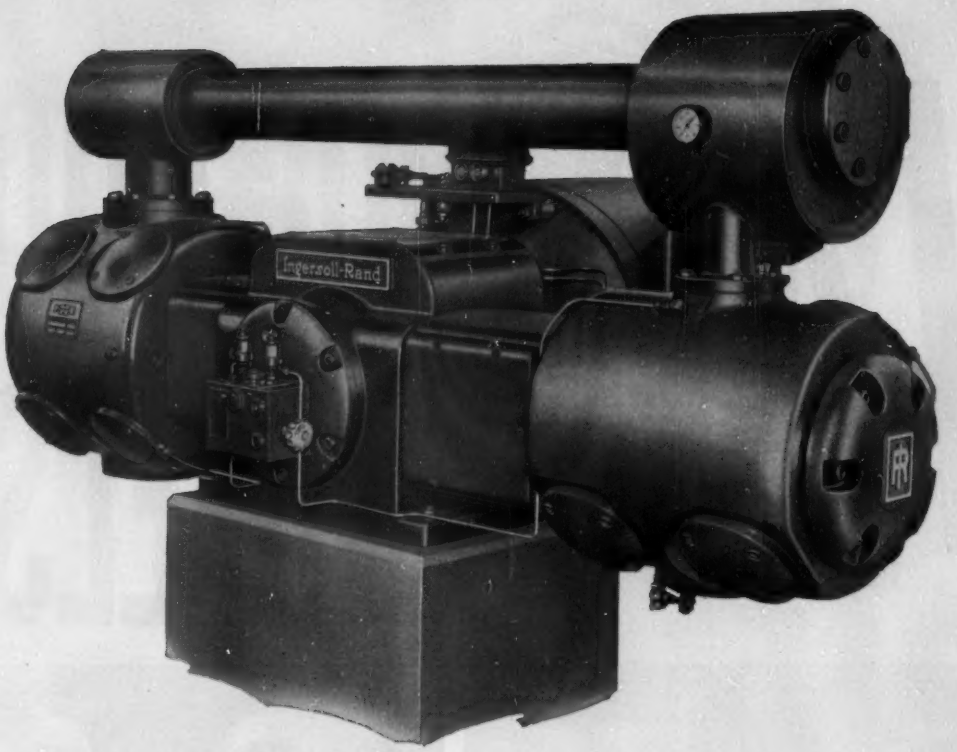
MANUFACTURERS OF STANDARD AND SPECIAL BALL BEARINGS, SPECIAL ROLLER BEARINGS AND PRECISION PARTS . . . TO THE MOST EXACTING SPECIFICATIONS . . . FOR EVERY INDUSTRY

NEW

OPPOSED-CYLINDER

BALANCED DESIGN, TYPE PHE

COMPRESSOR



COMPACT, SPACE-SAVING PACKAGED DESIGN

The new, space-saving PHE design marks another Ingersoll-Rand achievement in electric-driven compressors. Built for continuous, heavy-duty service, it includes the following outstanding features: Opposed pistons with excellent running balance — Efficient tube-type intercooler—New cylinders with Type A Channel Valves—Motor mounted directly on crankshaft—Full floating aluminum main and crank-pin bearings — Sealed crankcase — Force-feed lubrication.

FOR EASY SHIPMENT, INSTALLATION & RELOCATION

Shipped completely assembled and ready to run, the PHE compressor can be easily installed—in very little floor space—with a minimum of piping—and on a simple inexpensive foundation. Relocation, if required, is equally simple.

ELECTRIC-DRIVEN 75 AND 100 HP SIZES

The basic design is a two-stage unit for 80-125 psi. For other pressures, or for pumping vacuums, alternate cylinder arrangements can be supplied. It will pay you to get all the facts on this new, cost-saving design. Ask for Bulletin No. 3155.

Ingersoll-Rand

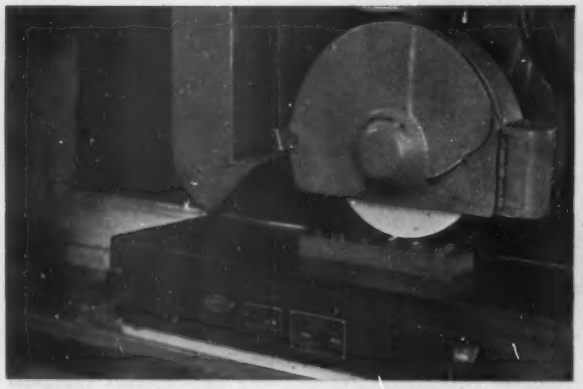
1-106 11 Broadway, New York 4, N. Y.

COMPRESSORS • AIR TOOLS • ROCK DRILLS • TURBO BLOWERS • CONDENSERS • CENTRIFUGAL PUMPS • DIESEL AND GAS ENGINES

COMPLETELY NEW

...A COMPLETE LINE!

V40 BOND TOOL ROOM WHEELS



A COMPLETE LINE OF WHEELS (Straight • Recessed • Straight Cup / Flaring Cup • Dish • Saucer) FOR EVERY TOOL ROOM OPERATION

...continually putting more sense in your abr[illegible]

COMPLETELY NEW!
FASTER CUTTING... and
COOLER CUTTING

Even heavy infeeds can be taken without burning the stock or overheating the tool.

GREATER FORM-HOLDING ABILITY... yet
EASIER, FASTER DRESSING

when required, because of the special new vitrified bond composition.

EASY TO ORDER! Grit for grit, grade for grade, these new wheels match your present specifications. *But*—see how the V40 Bond Wheel outperforms any other tool room wheel you are now using.

TRY ONE NOW! Call your CARBORUNDUM Distributor or Salesman (listed in the yellow pages of your phone book under "Abrasives" or "Grinding Wheels") for full details on these outstanding wheels. One trial will convince you! Write to The Carborundum Company, Dept. AM 81-412, Niagara Falls, N. Y.

CARBORUNDUM

REGISTERED TRADE MARK

81-412

MAXITORQ
Overload Release
CLUTCH

protects against conveyor overload

FOR THE LAMSON CORPORATION

This prominent Syracuse, N. Y., manufacturer of materials handling equipment has selected the Maxitorq Overload Release Clutch for power transmission on its drive unit for the Lamson overhead conveyor. On installations which handle heavy loads the cam design feature automatically causes instant disengagement of the clutch when the overload is substantially greater than the normal driving load . . . thus preventing damage to product and machine.

The Overload Release Clutch has all of the highly favored features of the standard Maxitorq floating disc clutch . . . Separator springs that keep discs "floating" in neutral . . . no drag, no abrasion and, consequently, no heating in neutral. Assembly, adjustment and take-apart are made without use of tools. Engagement is easily controlled, with light pressure. Disengagement is instant and complete.

There are six capacities, ¼ to 5 h.p. at 100 r.p.m. Maximum working torque from 13 to 263 ft. lbs. There are so many varied applications of this Overload Release Clutch that we suggest submitting your clutch problems to our engineering department for practical recommendations. In other words, "let's talk Maxitorq."

SEND FOR CATALOG NO. AM-10

THE CARLYLE JOHNSON MACHINE COMPANY
MANCHESTER • CONNECTICUT

YOU GET MORE WITH ALL-PURPOSE "TRICLENE"* D

(TRICHLORETHYLENE)

New Du Pont solvent is unsurpassed in any vapor degreasing job!

Check these extras

EXTRA DURABILITY. With the greatest all-around ruggedness ever built into a trichlorethylene, *new* "Triclene" D has unsurpassed resistance to *all* major causes of solvent breakdown—heat, light, air, metal chlorides, and acidic materials—yet contains nothing to harm the most delicate metal surfaces.

EXTRA OPERATING ECONOMY. Because *new* "Triclene" D is free from salt-forming inhibitors and staining materials, you get safe, thorough cleaning with fewer costly rejects—fewer interruptions for cleanouts. Made with locked-in stabilizers, *new* "Triclene" D retains its original ruggedness even after repeated use and distillation.

EXTRA CONVENIENCE. *New* "Triclene" D is an all-purpose solvent, built to give you dependable performance in any vapor degreasing job. This means you can buy just *one* brand of solvent for any type degreaser—for any class work.

Try *new* "Triclene" D and see why we consider it the greatest improvement ever made in any trichlorethylene for vapor degreasing. Your Du Pont representative will be glad to give you further details on *new* "Triclene" D. Call him today or fill out and mail coupon below.

*REG. TRADE-MARK.

New All-Purpose

"TRICLENE" D

Trichlorethylene

DU PONT

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

SEND FOR THIS NEW DESCRIPTIVE FOLDER

E. I. du Pont de Nemours & Co. (Inc.) AM-1011
Electrochemicals Department, Wilmington 98, Del.

☐ Please send me your descriptive folder on new, all-purpose "TRICLENE" D.

☐ Please have your representative call with the details.

Name _____ *Position* _____

Firm _____

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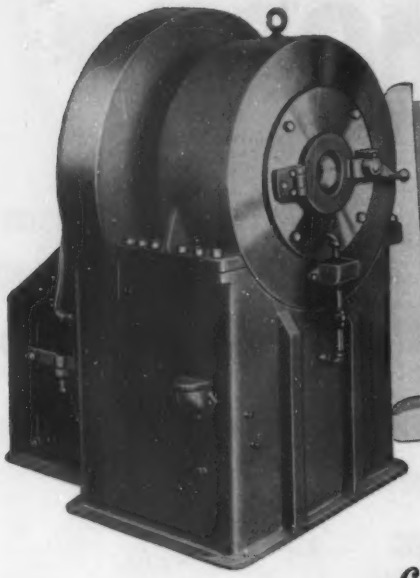
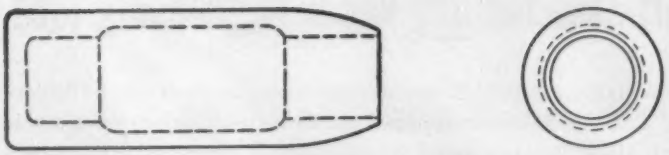
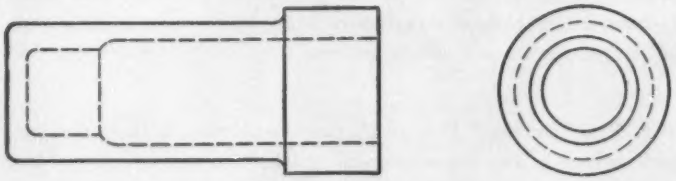


Swaging Success Stories

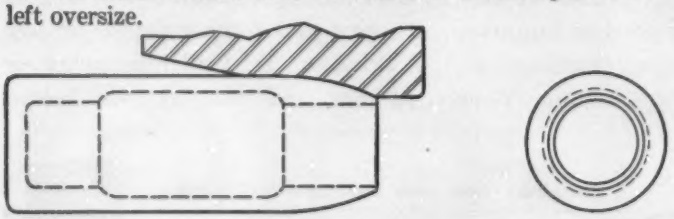
Shaping inside chamber...simplifies machining



This finished piece with its specially shaped inside diameter presented a problem until Torrington's swaging experts were called in.



They suggested starting with this drilled, reamed and formed blank. Notice that the material at the open end is left oversize.



One swaging operation in dies designed for the job shaped the inside chamber as well as the outside to the desired contour.

Look at these Swaging Economies

1. Swaging is fast—it is ideally suited to mass production of special shapes.

2. Swaging is easy—it can be performed by unskilled labor.

3. Swaging is efficient—it utilizes nearly all the material without waste.

4. Swaging is inexpensive—it eliminates many costly screw machine operations, while giving metal better finish and resiliency.

For more information on swaging as a method for shaping or reducing metals, write for our informative booklet. It describes in detail the Torrington Rotary Swagers that may be able to help you write a "swaging success story" in your own plant.

THE TORRINGTON COMPANY
Swager Department
222 North Street, Torrington, Conn.
Makers of Torrington Needle Bearings

TORRINGTON ROTARY SWAGING **MACHINES**

Variac® MOTOR SPEED CONTROLS

for Adjustable, Constant-Speed Operation of D-C *Motors from* A-C *Lines*

Introduced by General Radio Company in 1949, the VARIAC® Motor Speed Control won immediate acceptance as a new and unique system for varying speed of d-c motors operating on a-c lines.

Separate selenium rectifiers for field and armature, with a VARIAC continuously-adjustable autotransformer ahead of the armature rectifier, provide a unique combination of characteristics. This is a true adjustable armature-voltage speed control in extremely simple and compact form.

VARIAC Motor Speed Controls feature:

Very Wide Speed Range—continuously-adjustable from rated speed to zero. Full rated torque can be delivered even at zero speed continuously without overheating.

No Electron Tubes — selenium rectifiers require no warm-up—motor starts immediately when the power is turned on

Excellent Controlled-Starting Characteristics—delicate equipment can be started without jerk. Heavy machines can be started very quickly.

Very Fast Start-Stop-Reverse—ample capacities permit heavy loads to be started, stopped and reversed repeatedly, without damage

Extra-Smooth Torque—satisfies the most critical requirements for low torque pulsation—excellent for such applications as precision grinding

Effectively Eliminates Need for Gears, Step Pulleys, and other types of mechanical speed changers. Any speed desired can be obtained

Low Initial Cost—Simple Installation

Long Life with minimum maintenance—no tubes to replace

Available in 9 Models for d-c motors from 1/15th hp and less to 1½ hp

Prices shown do not include motor. Standard motors for each control are sold separately and are obtainable from General Radio. Prices and specifications on request.

We sell direct. Prices shown are NET, f.o.b. Cambridge or W. Concord, Mass.

Type 1701-AK . , $75
For shunt-wound d-c motors. Toggle switch selects speed range; either 0 to rated or 0 to twice rated. All controls on panel.

Type 1701-AM . . $75
Similar to Type 1701-AK (above) except speed range 0 to rated, only. All controls on panel.

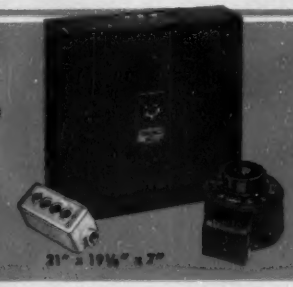
Type 1701-AU . . $75
For high-speed shunt motor performance from universal motors. Speed range 0 to rated. All controls on panel..

Type 1703-A . . $97.50
For d-c shunt or compound-wound motors. Dynamic braking for extra fast stopping. Speed range 0 to rated. All controls on panel.

Type 1700-B . . $170
For d-c shunt or compound-wound motors. Dynamic braking for extra fast stopping. Speed range 0 to rated. All controls on panel.

Type 1702-A . . $245
For d-c shunt or compound-wound motors. Dynamic braking. Speed range 0 to rated. All controls on panel.

Type 1702-M . . $350
Identical with Type 1702-A (above) except for push button operation at remote control station.



Type 1704-A . . $470
For d-c shunt or compound-wound motors. Speed range 0 to rated. For push button operation at remote control station.

Type 1705-A . . $495
Identical in size and appearance with Type 1704-A (above). For d-c shunt and compound motors. For push button operation at remote station. Speed range 0 to rated.

Since 1915
Manufacturers of Electronic Apparatus for Science and Industry

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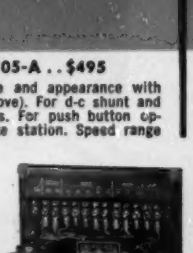
To meet the requests of many manufacturers and users who want to incorporate these versatile units into their own equipment or machines, four models are now supplied in stripped-down form.

They consist of the basic components mounted on a panel and wired to a terminal strip; all necessary leads are brought out.

All of the standard functions of the mounted models, including fusing, dynamic braking and start-stop-reverse can be incorporated easily in the external circuits in the users equipment.

Illustrated is the Type 1700-BW for 1/4-1/3 hp motors. Unit Price: $135.00. Other models available are for 1/6, 3/4 and 1 hp.

Quantity prices on the stripped-down units are available upon request.



Write for the VARIAC MOTOR SPEED BULLETIN

Kaukauna At Work....

UNIVERSAL RADIAL DRILLING MACHINES

Drilling angular holes in bore of casting is a job that requires accuracy, fast tool positioning and plenty of power to take full advantage of the highest feeds and speeds permissible with modern cutting tools. Kaukauna Universal Radial Drills have the power, accuracy and stamina to do this work quickly, easily and at low cost. A versatile line of machines with simplified controls, they maintain efficient high production on large, unwieldly workpieces or small production parts, and perform drilling, reaming, boring, counterboring, tapping and spot-facing operations. They do jobs that no other machines can do . . . save time and money.

With extended column, runway and reach, this Kaukauna Universal Radial Drilling Machine is saving set-up time by drilling, tapping, driving studs and spot-facing with speed and accuracy from any angle on diesel engine bases and blocks.

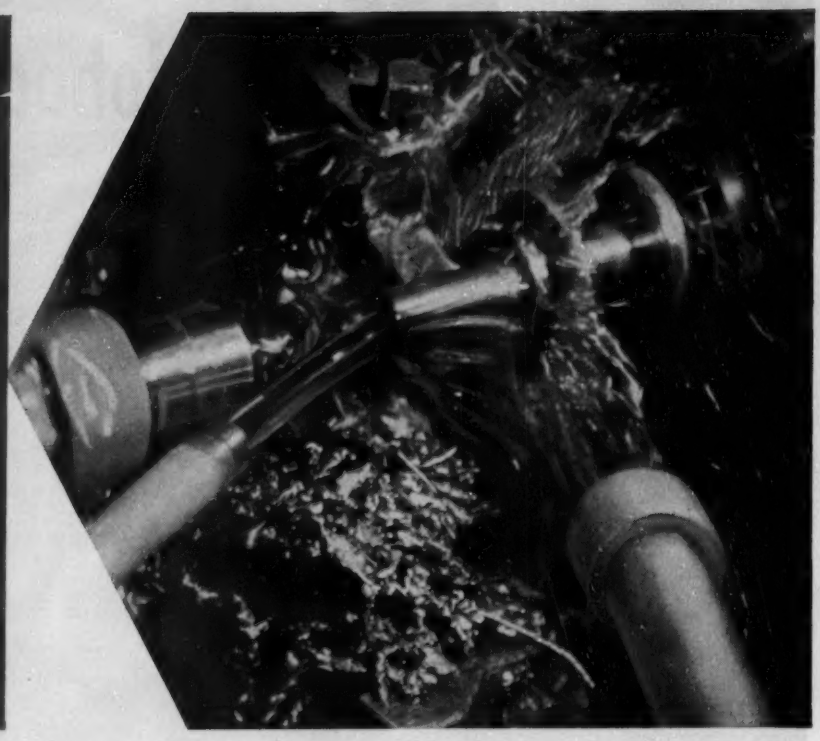
Kaukauna builds Universal Radial Drills and Horizontal Drilling Machines in a range of sizes which meet practically all requirements in modern production practice. Write today for descriptive catalog or ask representative to call.

KMC

Kaukauna MACHINE CORPORATION

KAUKAUNA, WISCONSIN, U. S. A.

NEW
ATLANTIC
Cutting
Oils



Cut the Tough Jobs Down to Size

No need to pamper these Atlantic Cutting Oils. Put them to work on the toughest cutting job in the shop. Then see the difference they can make . . . in long tool life, top production, even in shop morale.

Notice how Atlantic non-soluble cutting oils give you high production on hot, tough jobs — and without foul odors. Note, too, that the work is visible right through the oil. All these oils are compatible when blended.

Operators like Atlantic Cutting Oils because they do not indelibly stain hands and clothing . . . they make a cleaner shop possible.

You can get full information on these oils and a copy of the valuable new Cutting Oil Selector Chart, which shows how to select the right Atlantic Cutting Oil for the job. Just write for your copy to a nearby Atlantic office, listed here, or to The Atlantic Refining Company, 260 South Broad Street, Philadelphia 1, Pa.

ATLANTIC

LUBRICANTS · WAXES
PROCESS PRODUCTS

PROVIDENCE, R. I., 430 Hospital Trust Bldg.
READING, PA., First and Penn Avenues
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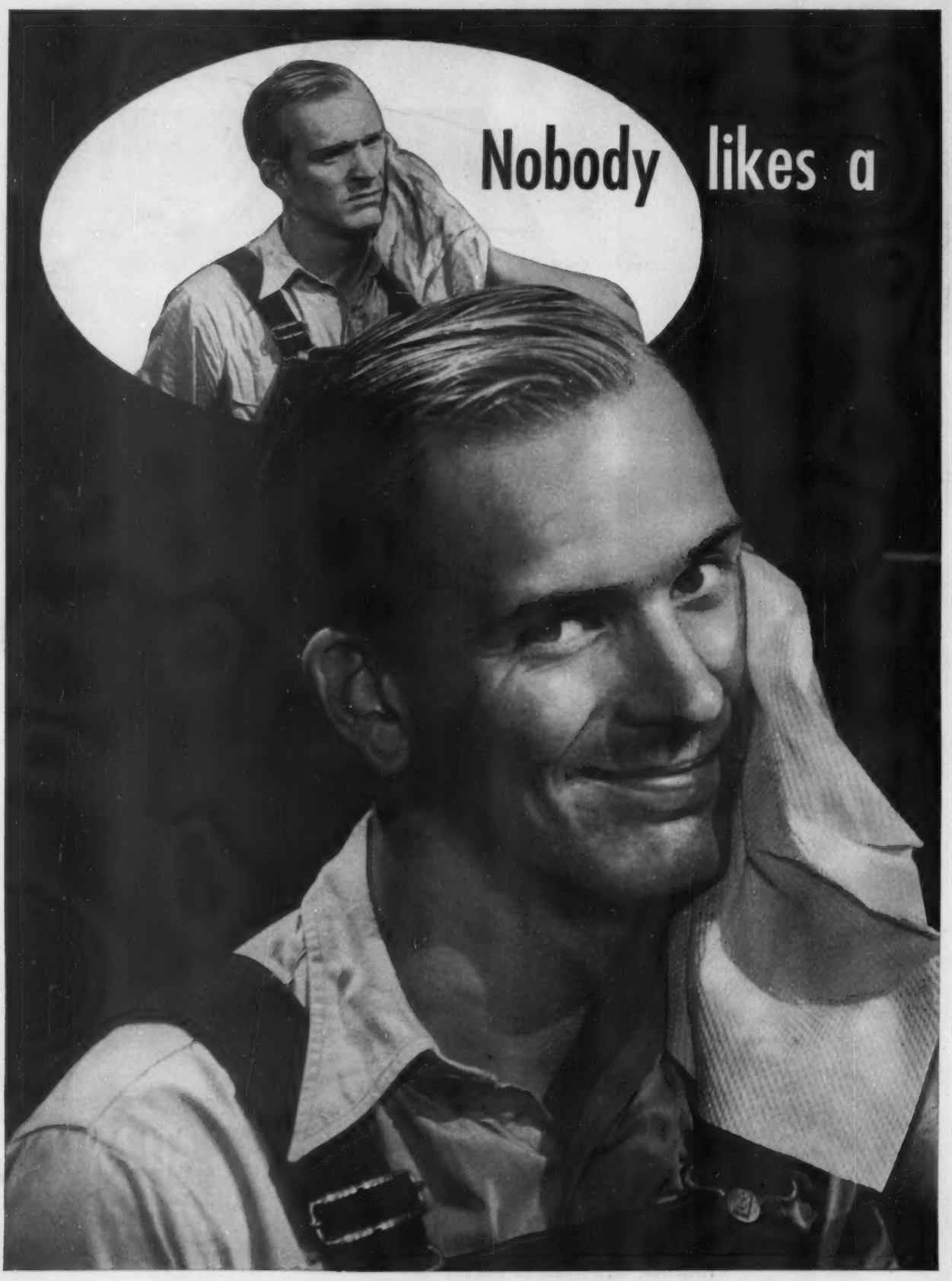
PITTSBURGH, PA., Chamber of Commerce Bldg.


Nobody likes a

dirty wiper

...Another good reason for switching to **Scott Wipers!**

Because a clean, fresh one is always available—Scott Wipers provide a constant source of clean chip-free wiping material.

Scott Wipers are sanitary and disposable. They greatly reduce the costly scratches and digs in finished work caused by chips lodged in wiping materials. They end the laundering problem and simplify distribution and control.

Scott Industrial Wipers are two-ply and tough yet soft and absorbent. Compare them with whatever wiping material you're using now—for cost, for convenience, for performance.

The Scott representative or distributor in your area will be glad to help you set up a production line demonstration in your plant. Call him or mail this coupon today.

Scott Paper Company, Dept. AM-1, Chester, Pa.
Please send me full information on Scott Industrial Wipers.

Name_____

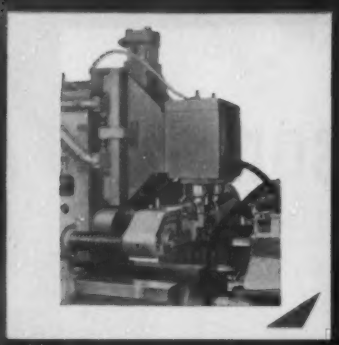
Position_____

Company_____

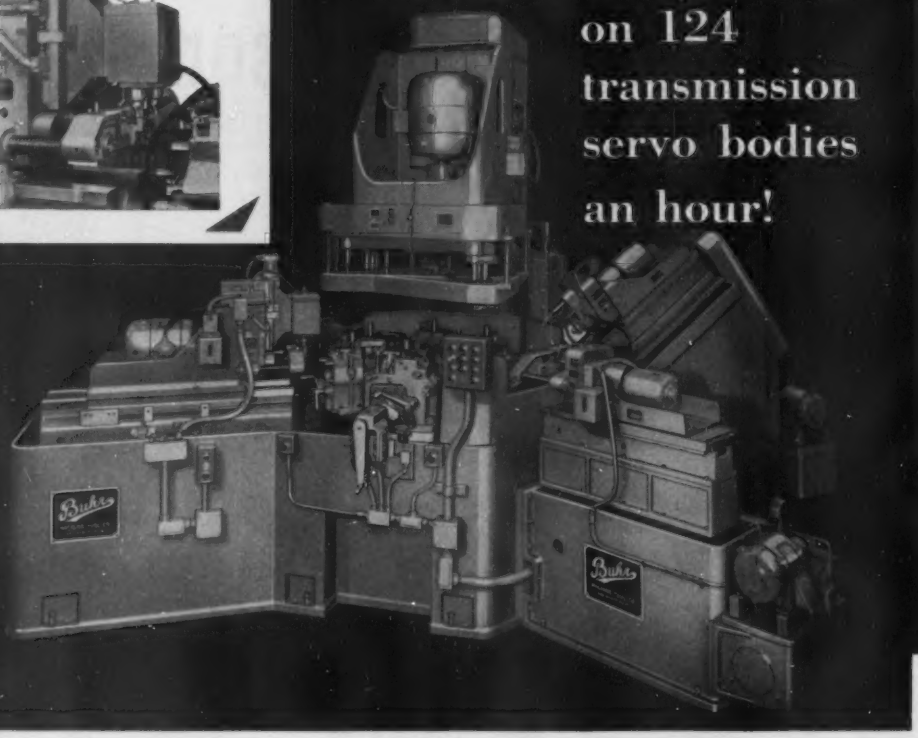
Address_____

City_____ State_____

Buhr SPECIAL...



Performs 18 operations on 124 transmission servo bodies an hour!



This 5-way automatic-indexing dial-type Buhr Special has a 6-station, 2-position fixture which features relocating the part in each fixture.

Especially noteworthy is the *special milling head* arranged with automatic back-up so that cutters do not disturb the close micro-finish on their return stroke. (See inset blowup above.)

A tool board is used to keep tool-changing time to minimum.

Multiple heads are of Buhr ball-bearing construction with shaved gears and broached-and-splined drives — a Standard Feature on all Buhr Specials.

Available at your request — our 48-page Catalog or a consultation with one of our sales executives.

Buhr

BUHR MACHINE TOOL COMPANY
250 GREEN STREET, ANN ARBOR, MICHIGAN

MULTIPLE-SPINDLE HIGH PRODUCTION MACHINERY

Solidly Engineered . . . Precision Built . . . for World's Leading Manufacturers

Mr. Vincent Sillitta, Traffic Manager of Clarostat Mfg. Co., Inc., discloses

"How this guided missile gets there on time!"

"... 5, 4, 3, 2, 1, *fire* ... and a Clarostat product helps head the missile for an 'enemy' bomber!

"But before its deadly rendezvous, that tiny part of the missile's 'brain,' a Clarostat resistor, had to keep another vital appointment—with the Guided Missile production schedule.

"That date was kept by Air Express!

"We ship up to 15,000 pounds of Clarostat Resistors per month by Air Express. Their sizes range from the one mentioned above—finer than a human hair—to shipments weighing one hundred pounds and more.

"With Air Express help, we can meet extremely exacting delivery specifications. Yet most shipments cost *less* than by any other air service. A 25 lb. shipment from Boston to Toledo, for instance, costs $6.45. That's 5¢ *less* than the next lowest air carrier—and the service can't be compared!"

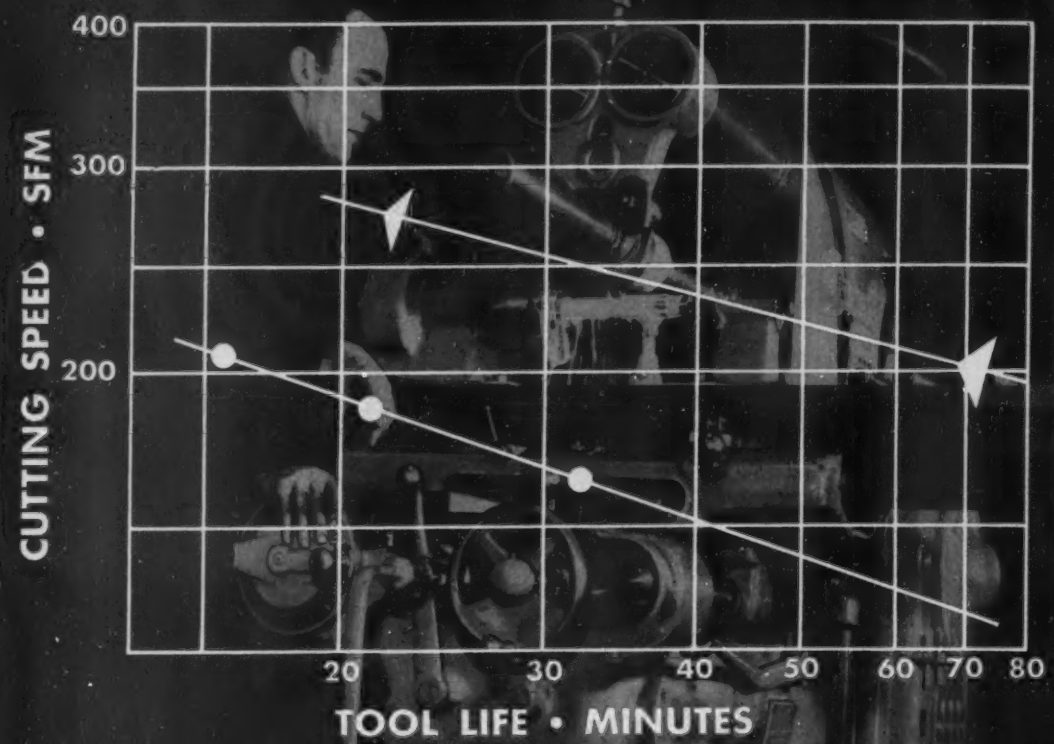
It pays to express yourself clearly. Say Air Express!

Air Express

GETS THERE FIRST *via U.S. Scheduled Airlines*

CALL AIR EXPRESS ... *division of* RAILWAY EXPRESS AGENCY

WHY IT PAYS TO BUY USS CARILLOY FC STEEL



50% FASTER MACHINING! 5 TIMES LONGER TOOL LIFE!

● These curves prove the excellent machinability of CARILLOY FC steel. They were obtained from an actual machining test on a Constant Pressure Test Lathe.

Samples of CARILLOY FC steel and of the AISI 4100 series of comparable hardness levels were quenched and tempered to 285 BHN. Identical tools were then used to machine both samples.

When the same cutting speed was used, tool life was five times longer on CARILLOY FC steel than on the 4100 series of the same hardness. When cutting speeds were adjusted to give the same tool life, the CARILLOY FC sample could be machined 50% faster. In actual production, this easier cutting materially reduces production costs.

One manufacturer reports that a changeover to CARILLOY FC steel cut his costs 12%. Another reports a saving of 25%. Wherever it has been used—in shafts, pinions, gears, axles, and other heavy-duty parts that require a lot of machining—CARILLOY FC has consistently cut costs.

For complete information about this amazing steel that is *hard* (255 to 375 BHN), *strong* (125,000 to 175,000 psi tensile strength), and *easy to machine*, call the nearest U. S. Steel Supply warehouse. Or write for our free brochure.

TRIPLE SECURITY

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When you want it
At the right price

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USS STEEL
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UNITED STATES STEEL

WE MAY BE A BIT MODEST

But . . . as a matter of fact . . . it is neither new nor unusual for Logan to make . . .

one-day delivery

ON AIR CYLINDERS
TO YOUR STROKE SPECIFICATIONS

Wire or Phone Orders Received Before Noon Will Be Shipped the Same Day

WHY TAKE A STROKE YOU DON'T WANT?

Always, when our customers request it, we have made delivery within hours on Air Cylinders to customer's stroke specifications (up to and including 8" bore). Hydraulic cylinders (small but not too small) take a little longer. Highest quality, dependability and prompt delivery are continuing factors on which Logan has built and maintains its reputation as the foremost manufacturer of air and hydraulic equipment.

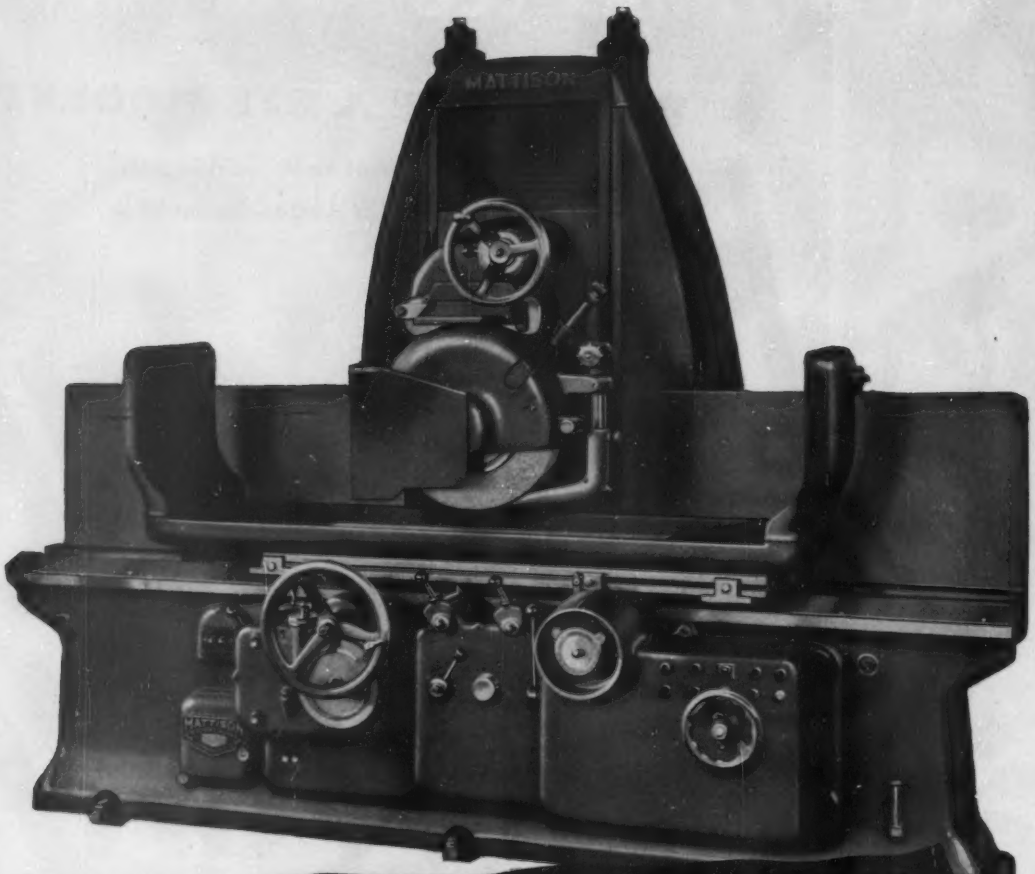
LOGAN MANUFACTURES 7023 STANDARD CATALOGED ITEMS

FREE CATALOG ON REQUEST

AIR CONTROL VALVES, Cat. 100-4 • AIR CHUCKS, Cat. 70-1 • AIR CYLINDERS, Cat. 100-1 • AIR-DRAULIC CYLINDERS, Cat. 100-3
AIR and HYDRAULIC PRESSES, Cat. 51 • COLLET GRIP TUBE FITTINGS, Cat. 200-5 • HYDRAULIC CONTROL VALVES, Cat. 200-4
HYDRAULIC CYLINDERS, Cats. 200-2; 200-3 • HYDRAULIC POWER UNITS, Cat. 200-1 • SURE-FLOW COOLANT PUMPS, Cat. 62

SAVES TIME — Logan — AIR AND HYDRAULIC EQUIPMENT — EFFORT • MOTION

LOGANSPORT MACHINE CO., INC., 818 CENTER AVE., LOGANSPORT, IND.



HERE'S A CHANGE THAT INCREASED PRODUCTION FROM 30 PER HOUR TO 200 PER HOUR

Both sides of type-stamps are now ground 200 per hour on a Mattison Grinder. Previous production—30 per hour.

● Because of the greater load and grinding area of their Mattison High Powered Precision Surface Grinder, Geo. T. Schmidt, Inc., Chicago, Illinois have been able to effect considerable savings in grinding time over their previous method. As an example—the type stamps shown in the picture above were formerly ground a few pieces at a time on a small grinder—30 per hour. The Mattison Grinder they are now using provides larger table space and a larger grinding wheel together with the necessary power and stability to permit the grinding of more pieces per load at a production rate of 200 per hour. Similar results are obtained on other parts.

Mattison High Powered Precision Surface Grinders have the high power and rugged double-column construction for rapid stock removal and the precision necessary for high quality finish and accuracy to close limits.

This combination not only will enable you to step up production on small parts, but permits grinding large work which previously could not be handled. For further information send for free circular.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

ANOTHER
COMPLEX
DRILLING PROBLEM

SOLVED

with a BAKER SPECIAL MACHINE

Baker Multi-Operation Machine utilizing standard Baker 7½ x 16 and 15 x 16 units and a 72" six-station power indexing table, performs drilling, chamfering, boring, counterboring, and tapping operations on clutch housings at the rate of 80 parts-per-hour at 100% efficiency.

STATION No. 1
LOAD and UNLOAD

STATION No. 2
VERTICAL UNIT
No. F Drill thru 2 holes .257
Drill thru 1 hole 15/32
Drill thru 5 holes 13/32
Drill thru 2 holes 25/64
Drill thru 3 holes "U" (.368)
HORIZONTAL UNIT
F Drill thru 8 holes
Mill Pad

STATION No. 3
VERTICAL UNIT
Comb. 15/16 drill & 1/16 x 45°. Chamfer 2 holes. Rough bore center bore 1 hole. Rough bore starter bore 1 hole.

STATION No. 4
VERTICAL UNIT
2 holes .438/.499 dia. ream
1 hole semi finish center bore
1 hole comb semi finish and finish starter bore
HORIZONTAL UNIT
8 holes ⅜ dia. & 90° chamfer

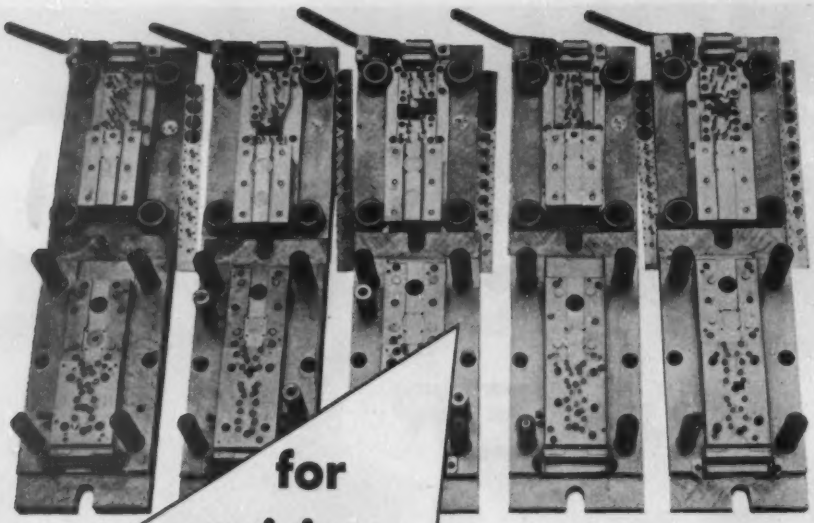
STATION No. 5
VERTICAL UNIT
2 holes ⅝ dia. x 90° chamfer
3 holes ½ dia. x 90° chamfer
2 holes spotface 1⅝ dia.
HORIZONTAL ANGLE UNIT
2 holes 15/32 drill
1 hole F (.257) drill

STATION No. 6
VERTICAL UNIT
3 holes 7/16—14 tap
2 holes 5/16—18 tap
HORIZONTAL UNIT
8 holes 5/16—18 tap

Baker Special Drilling Machines, composed of standard Baker units arranged to suit each individual problem, are designed for *productivity*. Units arranged in vertical, horizontal and angular planes perform multiple operations *faster . . .better . . . automatically* . . . with greater accuracy and efficiency. Consult Baker engineers for a better solution to your drilling problems.

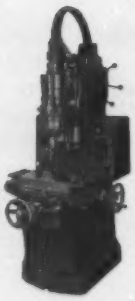
SINCE 1867

BAKER BROTHERS, INC. Toledo, Ohio
DRILLING . . . TAPPING . . . KEYSEATING and CONTOUR GRINDING MACHINES



for precision jobs like this....Moore Jig Borers and Jig Grinders are "MADE TO ORDER"

NO. 2 MOORE JIG BORER. Range 10" x 16" x 16" height. Features infinitely variable spindle speeds, three power feed ratios, centralized controls.



NO. 2 MOORE JIG GRINDER. Range 10" x 16" x 16" height. Grinding speeds from 12,000 to 60,000 rpm. Infinite feeds up or down; spindle-housing heat control; features slot grinding attachment.

Moore Jig Borers and Jig Grinders are made to order for jobs that require precision hole location—and plenty of it.

Take, for example, these five progressive compound dies used to pierce, shave, gut and blank intricate timing-device parts.

Holes in punch plate and stripper were jig bored in a No. 2 Moore Jig Borer. Holes in the corresponding die parts were jig bored in the same precision machine, hardened and then jig ground in a No. 2 Moore Jig Grinder. Perfect line-up was insured, since all holes had to be held to ± .0002", both for position and hole size.

The No. 2 Moore Jig Borer, with its built-in system of accurate lead screws, can spot, drill, bore or ream all holes in a workpiece to "tenths" with minimum tool changes. The No. 2 Moore Jig Grinder can accurately contour grind, slot grind and form grind die sections in a third of the time required by other means.

These Moore toolroom teammates provide a one-two punch that can knock the fat off your diemaking costs. They supply an *Engineered Hole Location Service* that permits tool and die sections to be produced concurrently...puts diemaking on an interchangeable-parts-and-assembly basis...lengthens die life...*saves you time and money* all along the line.

Write today for our detailed literature that pictures and describes many toolroom and production jobs for which Moore Jig Borers and Jig Grinders are made to order.

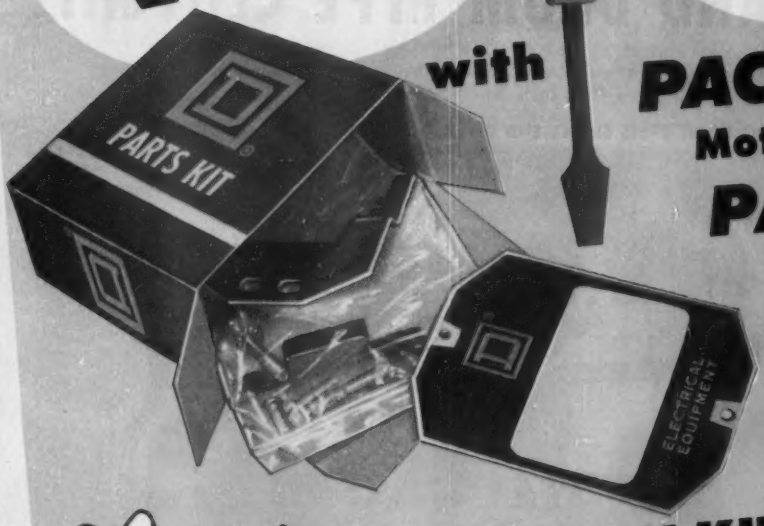
MOORE SPECIAL TOOL COMPANY, INC.
738 Union Ave., Bridgeport 7, Conn.

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTO-CRUSH WHEEL DRESSERS • DIE FLIPPERS • MOTORIZED CENTERS • HOLE LOCATION ACCESSORIES

Qwik Change

with **PACKAGED Motor Starter PARTS!**



New PUSH BUTTON KIT

OTHER KITS...

- Selector Switches
- Interlocks
- Replacement Parts
- Contacts
- Coils
- Overload Relays

EASY to Identify!

Easy-to-read catalogs, simplified motor control and overload relay selectors, illustrated service bulletins...these all combine to assure *quick changes* through easy parts identification.

EASY to Buy!

Conveniently packaged and labeled conversion parts are immediately available "off-the-shelf" from nationwide network of authorized SquareD electrical distributors.

FASTER to Install!

Conveniently packaged parts can be installed using only a screw driver and without disturbing any wiring.

Write for Bulletin 9999. Address Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin.

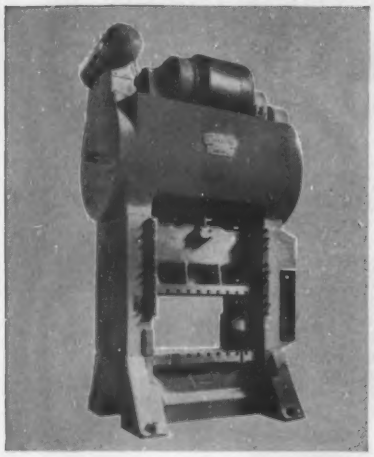
ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

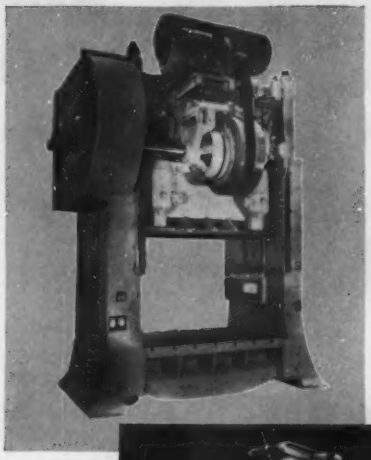
you get more...

out of every press with a CLEVELAND DRUM TYPE CLUTCH!

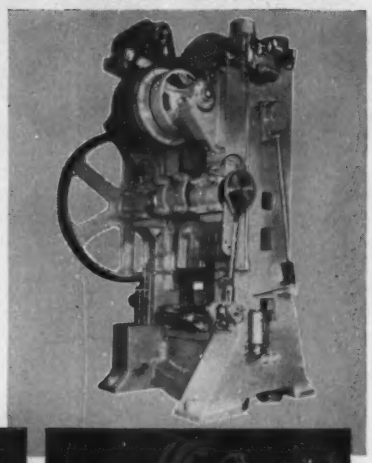
TWO POINT PRESS TWIN DRIVE



TWO POINT PRESS SINGLE END DRIVE



KNUCKLE JOINT PRESS



Extensive field use proves that the patented Cleveland Clutch and Brake improves all types of press performance. In every case operating records indicate less press downtime due to clutch failure; extended die life because of greater slide control.

Simplicity of design makes this air-operated clutch practically foolproof. Clutch and Brake cannot become separated or engaged simultaneously for they are a combined unit of one-piece construction. Positive, spring loaded brake brings slide to immediate stop on failure of electric current or air supply. Design and lightness of parts contribute to quicker starting and stopping.

As you can see in the presses shown here, the compact Cleveland Clutch is mounted directly on the driveshaft. Best of all, it's easily installed on new or old presses.

To get more out of your presses, install new Cleveland Drum Type Clutch units. We will gladly send you full specifications, or furnish you with any additional information you may desire on "The Clutch that's revolutionizing press production". A-9300

HORNING PRESS

INCLINABLE PRESS

THE CLEVELAND PUNCH & SHEAR WORKS CO.

Established 1880

POWER PRESSES — FABRICATING TOOLS

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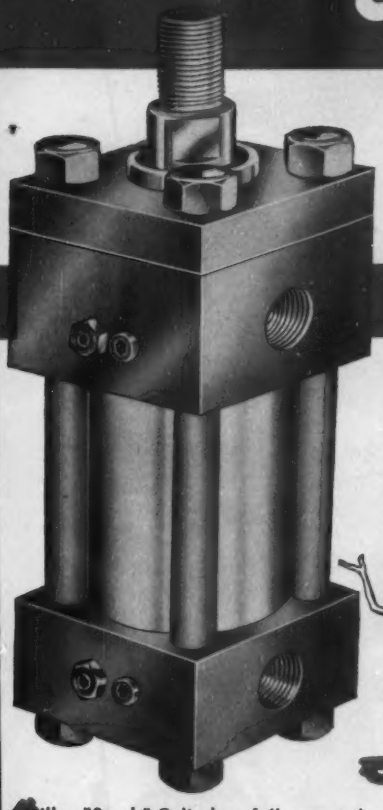
CITY FOUNDRY DIVISION • SMALL TOOL DEPARTMENT

Augmenting Miller's Quality-Famous Line of "Custom-Built" Cylinders...

Miller Stock AIR AND HYDRAULIC CYLINDERS

Available for *Immediate Delivery*...

in the popular sizes, mountings and prices listed below



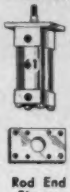
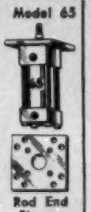
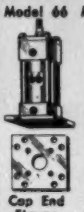
Any of the *Interchangeable* "Stock" Mountings illustrated are attached by our factory to the "in-stock" Basic Model 53 with the tie rod nuts in a few moments. This gives you a selection of over 500 different "Stock" Cylinders for *immediate use*—and permits easy conversion to other models for *future re-use*. Thus, you save delivery and production time, investment cost and storage space.
Additional sizes of Stock Cylinders are being added daily, considerably augmenting the list below. Write for complete list.

PRICES OF MILLER "STOCK" CYLINDERS WITH MOUNTINGS ATTACHED AS ILLUSTRATED

(Prices on the separate mounting attachments for future re-use are available on request)

ORDER DIRECTLY FROM THIS LIST . . .

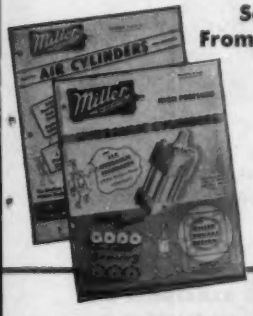
Shipment can be generally made within 24 hours after we receive your order. Prices are F. O. B. our plant.

			Basic Model 53		Model 77	Model 61	Model 62	Model 65	Model 66	Model 86
										
			Tie Rod Mounting		Foot Mounting	Rod End Flange	Cap End Flange	Rod End Flange	Cap End Flange	Pivot Mounting
Bore	Stroke	Cushion	AIR A53	HYD. H53	AIR A61 A77	HYD. H61 H77	AIR A62	HYD. H62 H65	AIR A66	HYD. H66 H86
1½"	2"	Non		$ 58.50		$ 61.40		$ 66.70		$ 72.85
1½"	4"	Non		60.70		63.60		68.90		75.05
1½"	6"	Non		62.90		65.80		71.10		77.25
1½"	8"	Non		65.10		68.00		73.30		79.45
1½"	11"	Non		68.40		71.30		76.60		82.75
2"	2"	Non	$ 37.70		$ 39.75		$ 42.30		$ 44.60	
2"	4"	Non	39.40		41.45		44.00		46.30	
2"	6"	Non	41.10		43.15		45.70		48.00	
2"	8"	Non	42.80		44.85		47.40		49.70	
2"	11"	Non	45.35		47.40		49.95		52.25	
2"	3"	Both	62.05	94.50	64.10	97.45	66.65	103.05	68.95	111.55
2"	5"	Both	63.75	97.00	65.80	99.95	68.35	105.55	70.65	114.05
2"	7"	Both	65.45	99.50	67.50	102.45	70.05	108.05	72.35	116.55
2"	9"	Both	67.15	102.00	69.20	104.95	71.75	110.55	74.05	119.05
2"	13"	Both	70.55	107.00	72.60	109.95	75.15	115.55	77.45	124.05
2½"	2"	Non	41.45	73.30	43.70	76.25	46.25	82.30	49.00	93.10
2½"	4"	Non	43.35	76.00	45.60	78.95	48.15	85.00	50.90	95.80
2½"	6"	Non	45.25	78.70	47.50	81.65	50.05	87.70	52.80	98.50
2½"	8"	Non	47.15	81.40	49.40	84.35	51.95	90.40	54.70	101.20
2½"	11"	Non	50.00	85.45	52.25	88.40	54.80	94.45	57.55	105.25
3¼"	3"	Both	77.80	126.85	80.35	131.20	84.15	138.60	87.70	149.95
3¼"	5"	Both	79.80	129.85	82.35	134.20	86.15	141.60	89.70	152.95
3¼"	7"	Both	81.80	132.85	84.35	137.20	88.15	144.60	91.70	155.95
3¼"	9"	Both	83.80	135.85	86.35	140.20	90.15	147.60	93.70	158.95
3¼"	13"	Both	87.80	141.85	90.35	146.20	94.15	153.60	97.70	164.95
4"	2"	Non	56.25	106.00	59.10	111.15	62.95	118.90	67.30	132.80
4"	4"	Non	58.85	109.40	61.70	114.55	65.55	122.30	69.90	136.20
4"	6"	Non	61.45	112.80	64.30	117.95	68.15	125.70	72.50	139.60
4"	8"	Non	64.05	116.20	66.90	121.35	70.75	129.10	75.10	143.00
4"	11"	Non	67.95	121.30	70.80	126.45	74.65	134.20	79.00	148.10
5"	3"	Both	98.25		101.40		105.25		110.60	
5"	5"	Both	101.65		104.80		108.65		114.00	
5"	7"	Both	105.05		108.20		112.05		117.40	
5"	9"	Both	108.45		111.60		115.45		120.80	
5"	13"	Both	115.25		118.40		122.25		127.60	
6"	2"	Non	80.60		83.95		87.85		94.15	
6"	4"	Non	84.90		88.25		92.15		98.45	
6"	6"	Non	89.20		92.55		96.45		102.75	
6"	8"	Non	93.50		96.85		100.75		107.05	
6"	11"	Non	99.95		103.30		107.20		113.50	
8"	3"	Both	157.35		161.05		167.90		174.95	
8"	5"	Both	162.45		166.15		173.00		180.05	
8"	7"	Both	167.55		171.25		178.10		185.15	
8"	9"	Both	172.65		176.35		183.20		190.25	
8"	13"	Both	182.85		186.55		193.40		200.45	

Miller "Stock" Cylinders fully meet the J.I.C. Standards and are identical to Miller "Custom-Built" Cylinders in design and construction.

"Stock" Air Cylinders are for 200 psi operation, "stock" hydraulic cylinders for 2000-3000 psi operation. Piston Rods of "Stock" Cylinders are "Style No. 2 Standard."

For complete descriptive and dimensional data on both "Stock" and "Custom-Built" Miller Cylinders, write for Bulletins A-105 and H-104 sent FREE on request.



Sales and Service From Coast to Coast!

Consult your local directory or write us direct for the name of our representative for your area

"Stock" Boosters, Tool Immediate delivery on Miller Dual Pressure Boosters; 5" bore, 1" ram (80 psi air input produces 2000 psi hydraulic output for driving one or more work cylinders simultaneously). In 6" and 12" strokes. Write for data and prices.

Complete Miller "custom-built" line includes: air cylinders, 1½" to 20" bores, 200 psi operation; low pressure hydraulic cylinders, 1½" to 6" bores for 500 psi operation, 8" to 14" bores for 250 psi operation; high pressure hydraulic cylinders, 1½" to 12" bores, 2000-3000 psi operation. All mounting styles available. Also, a complete line of Fluid Pressure Boosters and Accumulators.

MILLER FLUID POWER CO.

(Formerly MILLER MOTOR COMPANY)

2004 N. Hawthorne Ave. Melrose Park, Illinois

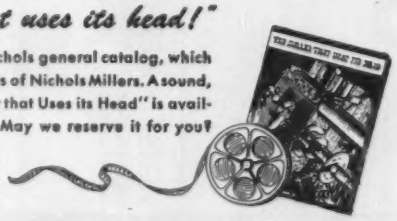
AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

. . . a complete line

The Nichols Miller, with "rise-and-fall" spindle, is one of the most precise, universal machines available today. The four models shown, fill most basic requirements—whether for single parts with simple set-up, or multiple operations on mass production jobs with tolerances to "tenths". Their versatility makes possible such operations as facing, boring, recessing, turning, slotting, key seating and contour milling, as well as regular milling. According to requirements, screw or lever longitudinal and transverse table feeds are available optionally. "The miller that uses its head" is your best choice—and one of industry's greatest values. If you want production to "tenths", investigate the Nichols Miller.

"the miller that uses its head!"

Write today for the Nichols general catalog, which describes the six models of Nichols Millers. A sound, color movie "the Miller that Uses its Head" is available for free showing. May we reserve it for you?



CONDENSED SPECIFICATIONS

Table Working Surface	6¾" x 21" or 30"
Longitudinal Travel (screw or lever)	10" or 19"
Transverse Travel (screw or lever)	7"
Vertical Travel — Knee	13½"
Rise and Fall of Spindle	4½"
Selective Speed Ranges up to 5000 R.P.M.	
Weight	1250 lbs.

MANUFACTURED BY W. H. NICHOLS COMPANY WALTHAM, MASSACHUSETTS

NATIONAL DISTRIBUTORS **NICHOLS-MORRIS CORPORATION**

76-F MAMARONECK AVE.
WHITE PLAINS, N. Y.

TEAMWORK

In the 1860's, a hundred courageous riders and over 400 mounts, kept the Pony Express open from St. Louis to San Francisco, through sheer unity of purpose.

The understanding between the rider and his mount exhibited the kind of teamwork that kept this chain unbroken — from one relay station to another — until the challenge had been met . . . the final goal accomplished.

Bath sales representatives are an important link in the chain between the customer and the Bath plant. Trained to interpret tap problems, they quickly pass on the necessary details to Bath engineers — another link in this important chain.

Bath ground thread taps — regular and custom built — are made with but one purpose in mind . . . to do the best threading job for your requirements. Let the Bath representative tell you how Bath teamwork spells *tap economy* for you!

Bath engineers check every detail, to see that all Bath Taps are conditioned to do the best threading job for your requirements.

Insist on BATH TAPS for BETTER THREADS

JOHN BATH & CO., Inc.

22 Grafton St., Worcester, Mass.

PLUG CYLINDRICAL AND THREAD GAGES • RING THREAD GAGES • GROUND THREAD TAPS • INTERNAL MICROMETERS

NEW Mallory "*No-Chat*" Tool Shanks

...minimize chatter... permit smoother, deeper cuts

*No-Chat** tool shanks are a completely new idea in machine tool technology. They offer you improvements in tool performance never before possible. The secret is a unique alloy developed by Mallory metallurgical research which has far greater density, rigidity and heat conductivity than steel.

SMOOTHER FINISHES, HEAVIER CUTS. *No-Chat* shanks are twice as dense and 75% more rigid than steel. On identical cuts, they reduce chatter by as much as 50% (see test pictures below). The smoother cuts you get may let you eliminate finish grinding . . . remove more stock per cut!

TOOLS LAST LONGER. *No-Chat* shanks conduct heat away from the cutting tip *three times faster* than steel. Because tools run cooler and vibrate less, they last longer between grinds. Expansion of the *No-Chat* shank closely matches that of the carbide tip . . . brazed joint is more permanent.

TIP ASSEMBLY IS EASIER. The non-annealing characteristic of this alloy eliminates problems of grain growth in brazing or welding. Excellent brazed joints between tip and shank can be obtained with a wide variety of brazing alloys.

SHANKS ARE RE-USABLE. New tips are readily brazed to the *No-Chat* shank.

Plan now to take advantage of this important development in the tools you manufacture or purchase. For complete data, write today for our new Technical Bulletin.

TESTS PROVE HOW *NO-CHAT* REDUCES CHATTER

These oscillograms show the greatly reduced amplitude of tool vibration with *No-Chat* shanks, using identical machine set-ups, when taking a 0.030" cut in low carbon cold rolled steel at 450 SFPM.

With ½" steel shank and style C-8 bit.

With ½" *No-Chat* shank and style C-8 bit.

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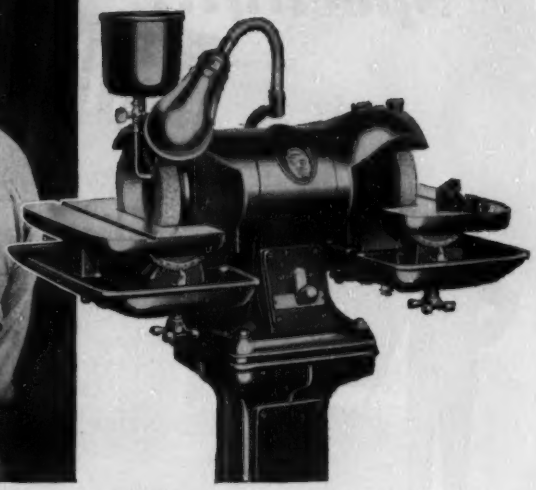
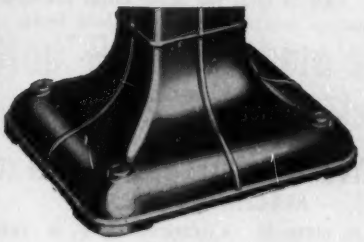


"Our DELTA Saved 20 Times Original Cost... WORTH ITS WEIGHT IN DIAMONDS"

"The savings effected with this 6" DELTA Grinder amount to over $2,000.00 over a nine-year period," reports Mr. Grey, shop foreman at Precision Gear and Machine Company.

Both bench and floor models of the DELTA Carbide Tool Grinder operate *without vibration* because they have dynamically balanced aluminum wheel mountings that are machined *after* assembly. Tilting table (30° toward and 45° away from the wheel) is supported by wide-spread, double trunions.



Precision Gear and Machine Company, Charlotte, N. C., placed a Rockwell-built DELTA Carbide Tool Grinder in their plant nine years ago. Employed to grind carbide cutting tools for eighteen lathes in the machine shop, the DELTA Grinder is equipped with one 6", 120 grit silicon carbide wheel, and 6" diamond wheel with ⅛" side face.

Comments.Boyce Grey, shop foreman: "In the nine years since we bought it, our DELTA 6" Grinder has saved us over $2,000.00. The ruggedness and accuracy of the DELTA lets us do the same quality work with 6" diamond wheels that we used to do with far more expensive 10" wheels. This means that the saving in diamond wheels alone has been over twenty times the original cost of the grinder. I guess you could say it's worth its weight in diamonds."

DELTA Carbide Tool Grinders and other rugged, low-cost DELTA Power Tools will perform 90% of the jobs in your shop to the same accuracy standards as special machines costing many times as much.

That's why — throughout industry — there is a growing trend toward accurate, portable, low-cost DELTA Power Tools, You can use them to cut costs, too. Talk to your DELTA Dealer; he's listed in the classified section of your phone book under "TOOLS" or "MACHINERY." Send the coupon for complete data.

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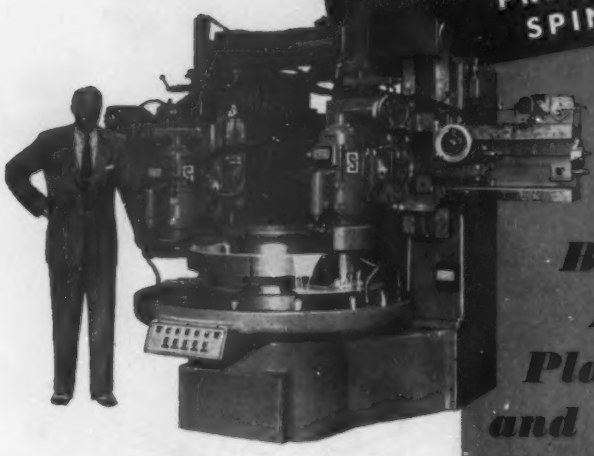

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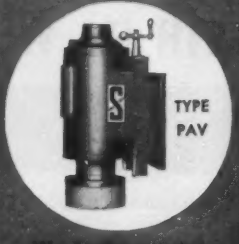

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"When it comes to finishing these 'Spill-Stop' Pourers, there's no comparison between Formbrite and ordinary drawing brass"

—says Spill-Stop Mfg. Co.

Spill-Stop* Manufacturing Company is enthusiastic in its praise for Formbrite*—Anaconda's new drawing brass.

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Spill-Stop goes on to say, "We find Formbrite fabricates almost as readily as the softest draw brass . . . the close tolerance to which your mill has held the gage has contributed greatly to the ease of fabrication."

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Formbrite has a superfine grain. Special methods of rolling and annealing produce a grain structure so fine that often a simple color buff will bring it to a bright, lustrous finish.

Formbrite is also harder, stiffer, springier and more scratch-resistant . . . yet it is surprisingly ductile, readily stamped, formed, drawn and embossed. And Formbrite plates beautifully.

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Formbrite is available in sheets, strips and coils — in all commercial widths and gages. Millions of pounds of this superior drawing brass have been made, sold and satisfactorily fabricated.

Want more proof? Send for a free sample of Formbrite. Try it in your polishing room. See for yourself how quickly and easily Formbrite polishes. Also ask for Publication B-39 which gives forming and finishing suggestions. Write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 5401

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in Stainless Steel Piping with HELIARC Welding

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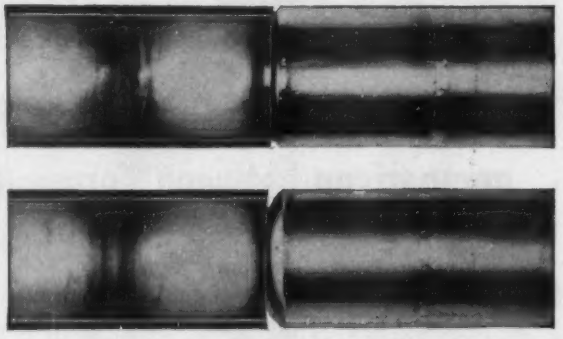
Smooth, sound joints—every time. HELIARC welding produces joints free from obstructions, notches, and crevices which hinder or trap flowing materials within the piping system. The penetration bead in the pipe is held within 1/32-in. of the pipe's normal inside diameter.

For the full story on argon-backed, stainless steel pipe fabrication, ask your local LINDE representative for the booklet, "Inert-Tungsten Arc Welding of Stainless Steel Piping," F-8463. In addition, he will be glad to give you complete information on how HELIARC welding cuts time and cost in many other applications. Start saving now—call him today.



Top—interior and exterior of completed welds without argon backing. Bottom—with argon backing, note the smooth, porosity-free, high quality welds.

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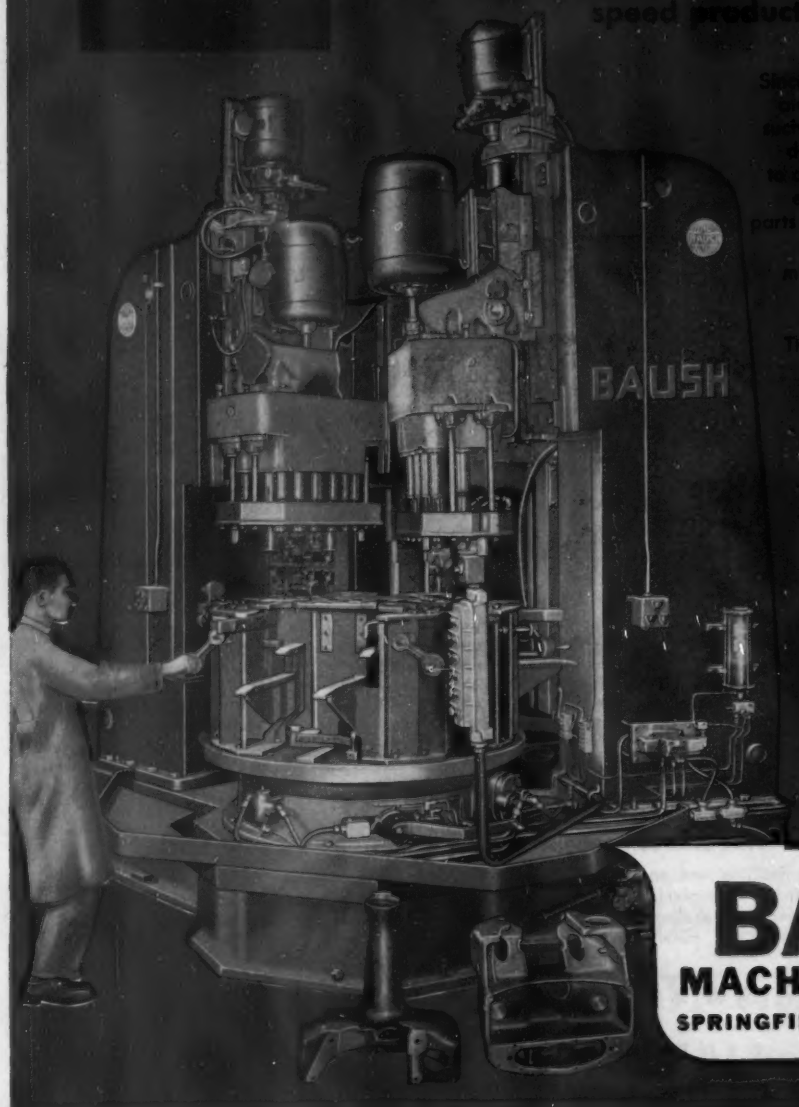

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How *Burgess-Norton...* redesign and production facilities cut costs and improve performance on **Stephens-Adamson* conveyor pins

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The pin was formerly a cold-headed design with a separate slip-over collar as a wear plate. The pin was not hardened and bearing areas varied in tolerance because pins were not ground after heading. Counter sink for cold-headed pin required extra machining time.

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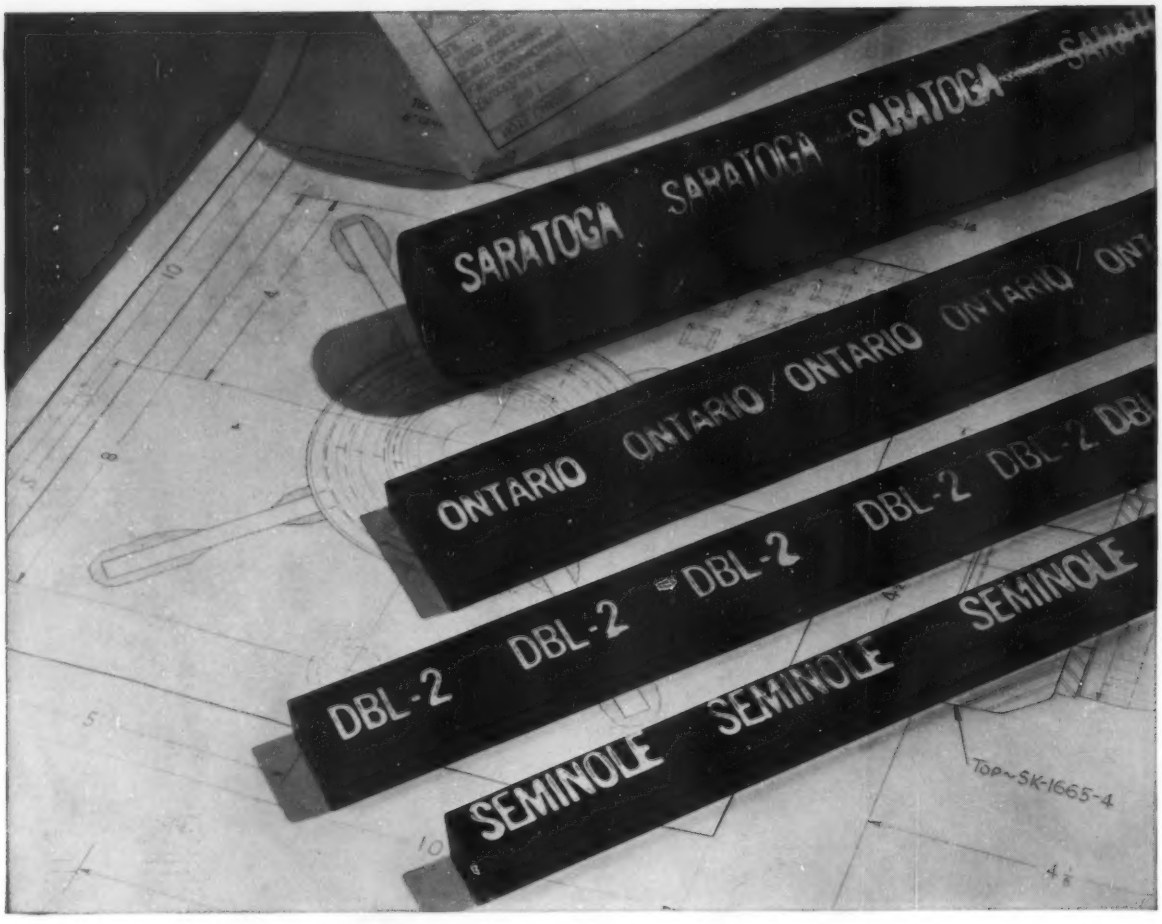

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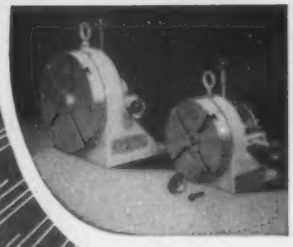

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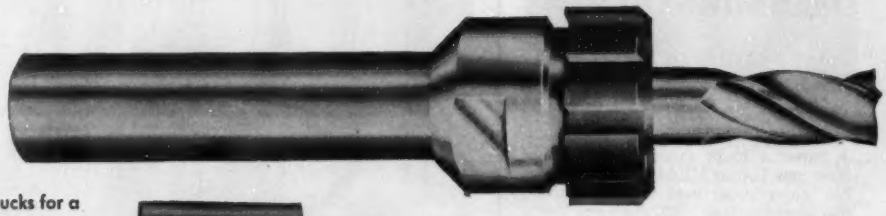

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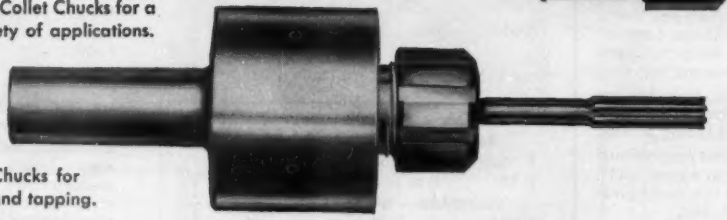

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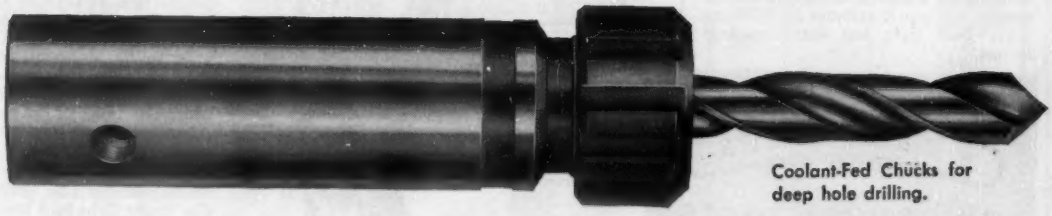

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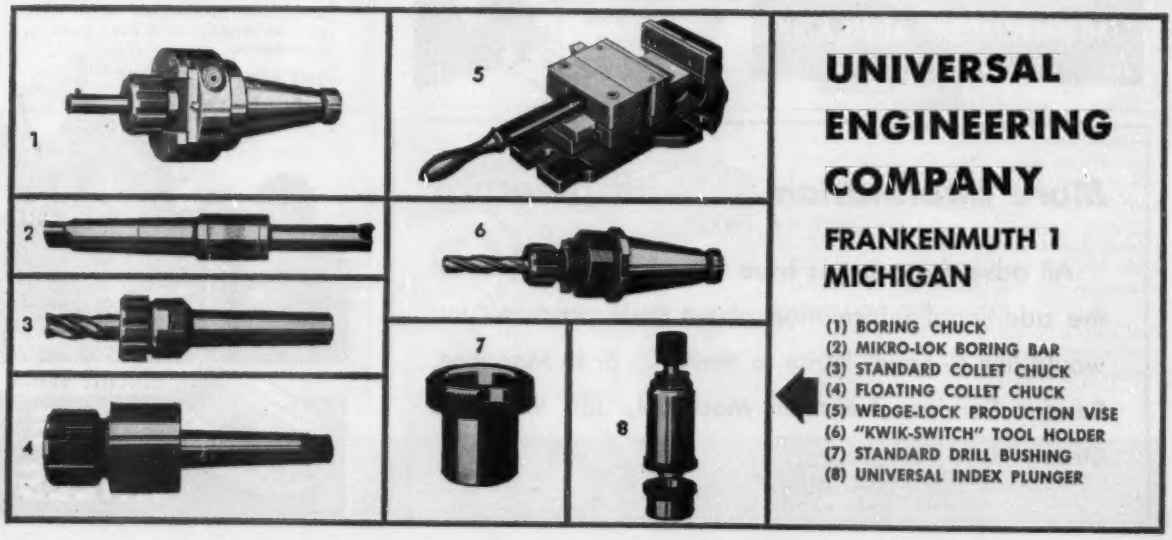

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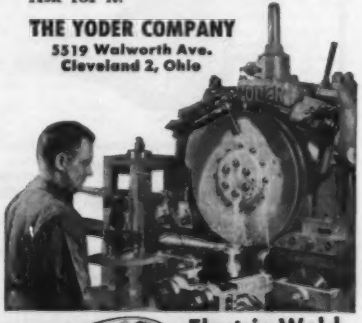

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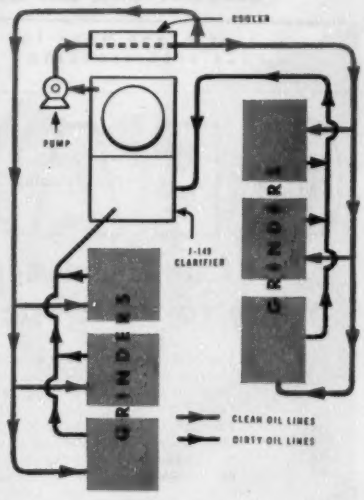
Houdaille J-149 Clarifier shown in operation at Cogsdill Twist Drill Co. 149 filter tubes suspended vertically within clarifier remove all abrasive contaminants from coolant without precoating, filter aids or expendable filter material of any kind.

Drill Manufacturer Also Reports Fewer Rejects, Elimination of Manual Pump and Sump Cleaning

Detroit (Spl.)—73% longer wheel life, better product finishes, and indefinite safe-use life of coolant—these are the benefits reported by Cogsdill Twist Drill Company since installation of a Houdaille J-149 Coolant Clarifier.

At Cogsdill—a leading Detroit manufacturer of drills and reamers—the "J" Type Clarifier provides centralized, multi-tube filtration of grinding coolant for six flute grinders.

Here's how the Cogsdill central coolant system operates:



Cogsdill states that grinding wheels, formerly dressed after a run of 75 pieces, now have an average life of 120 pieces. Clean coolant also prevents overheating and subsequent burning of drills.

Elimination of individual grinder pumps and sumps, which had to be serviced every two weeks, has greatly reduced labor and maintenance expense.

Thanks to the Houdaille "J" Type Clarifier, Cogsdill now gets more production from its grinders at less cost and at higher operating efficiency.

NEW MULTI-TUBE DESIGN MEANS MORE FILTERING CAPACITY AT LOWER COST

Houdaille "J" Type Clarifier Has 16,000 Sq. Inch Filtering Area... Self-Cleaning Filter Tubes

The "J" Type is ideal for all water based or mineral oil coolants used in individual machine tools or small central systems. Its 16,000 square inches of filtering area assure complete removal of chips, abrasives, dirt and other solid contaminants . . . keep coolant safe for re-use indefinitely.

Self-cleaning filter tubes, washed free of contaminants during brief backwash interval, require no manual cleaning or maintenance.

Simplicity of "J" Type's design assures dependable, low cost operation—no need for precoating, filter aids or expendable filter media.

Unit can be operated continuously or intermittently as desired. Several models available depending on capacities to be handled.

Write for equipment bulletin and case history . . . find out how the Houdaille "J" Type Clarifier can extend tool and wheel life and boost overall production in your machine tool operations.

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Oil Purification Equipment

Honan-Crane Corporation 205 Wabash Ave., Lebanon, Ind.
subsidiary of Houdaille-Hershey Corporation

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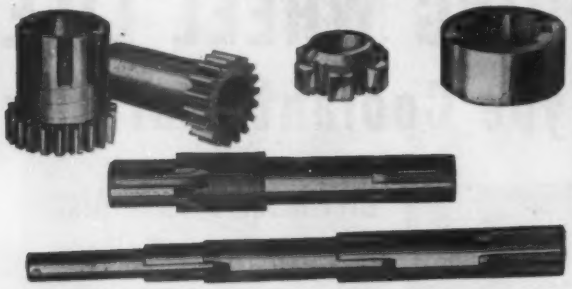

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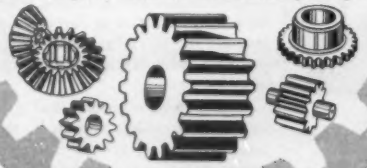

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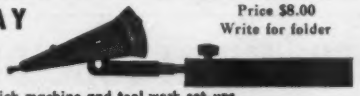

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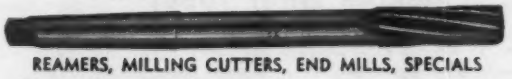

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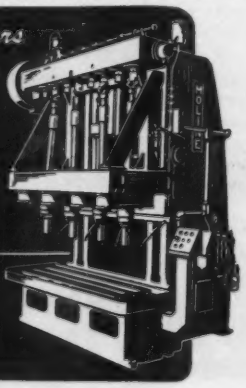

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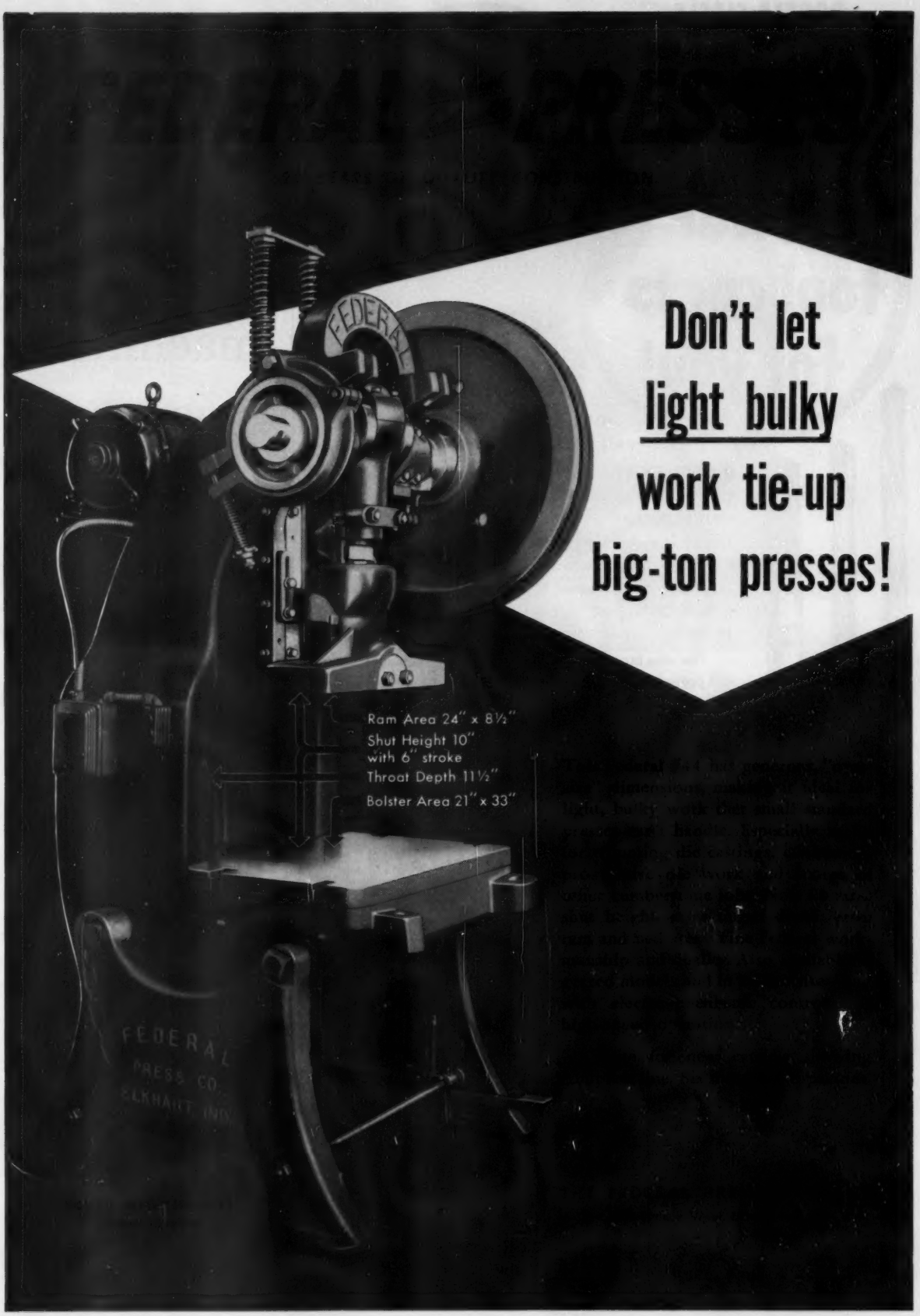
No. HU68—Hydraulic rail feed universal joint type multiple spindle drilling machine.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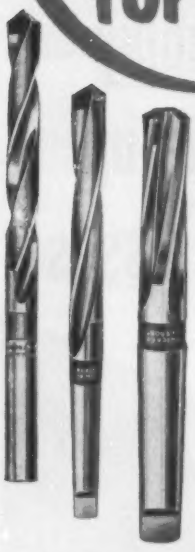

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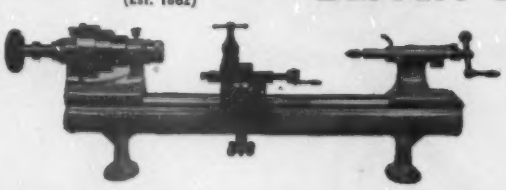

STARK NO. 3½ LATHE WITH 32" BED, Cone-bearing Headstock, Screw Tailstock, Compound Slide Rest. Maximum collet capacity ½". Concentricity of headstock spindle .0001". Delivery from stock.

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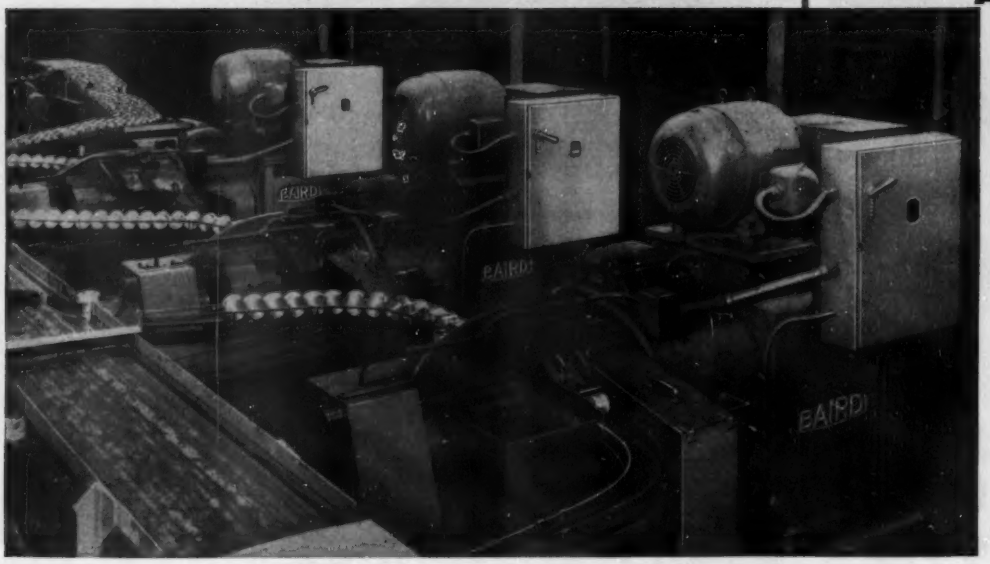

ENGINE PISTONS *travel fast* THRU *automatic* ASSEMBLY *of* BAIRD 6-SPINDLE CHUCKERS

With push-button operation in many large metal working plants, the Baird Chucker has graduated from a valuable single unit to an invaluable assembly for completely automatic production lines.

Higher, constant speed is one reason . . . minimum manpower . . . and maintenance of close tolerances during continuous removal of metal is, perhaps, the outstanding feature. The photo above shows an assembly of three Baird Chuckers automatically machining engine pistons in a leading automobile plant.

In this instance, operations include finish turning of the engine piston and finishing the oil ring grooves to size.

This Model 76H Chucker (7″ chucks, 6-spindle horizontal machine) combines, in a single indexing cycle, such operations as turning, facing, drilling, tapping, threading, grooving and chamfering, if required.

Electrical and mechanical safety devices prevent damage when any motions are out of time or sequence. All tooling is easily accessible . . . spindle speeds are individual and variable. Design and construction assure long service life. If you require repetitive production of this nature . . . hand load or unload or entirely automatic . . . ask Baird about it.

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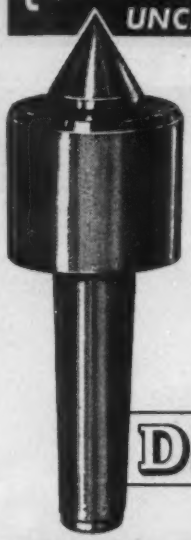

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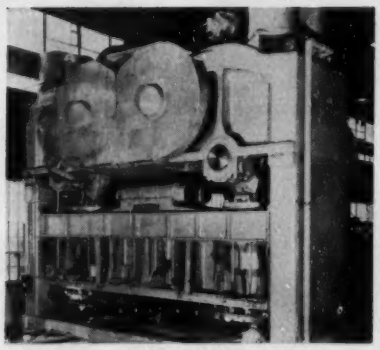
New Hamilton 4000 ton capacity press, in which there is no relative deflection in bed and slide, forms side rails that are perfectly straight

This Hamilton Side Rail Press was placed in production last winter in the Cleveland Plant of Midland Steel Products Company. It is an enormous machine, weighing 900 tons, which in itself is newsworthy. However, the outstanding feature is its ability, when loaded to 4000 tons pressure (its nominal capacity) to form perfectly straight side rails, without camber or "bow." This eliminates the subsequent straightening operation which has been the accepted customary practice in chassis frame manufacture.

OTHER "HIGHLIGHTS" OF THIS 4000 TON HAMILTON PRESS

- The bed is equipped with six 42-inch diameter air cushions providing 415 tons pad-pressure with air at 100 psi.
- The cushions are linked together and the operating valves are controlled by one pilot valve so that the six cushions function as a unit at all times.
- Overall height 44 feet with topmost point 30 feet above floor.
- 320 inch clear space between the uprights and gibs; shut height on bed 40 inches.
- Stroke of slide 22 inches; adjustment 12 inches.
- Drive motor 150 hp; slide adjusting motor 25 hp.



NEW HAMILTON PRESS at Midland Steel Products Company, Cleveland, Ohio is shown at top forming perfectly straight 22 ft. side rails of ⅜-in. steel without camber or "bow."

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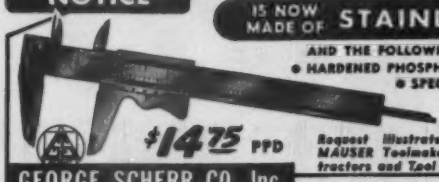

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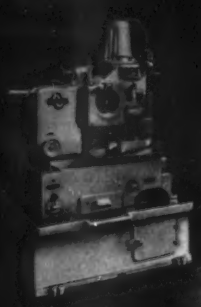

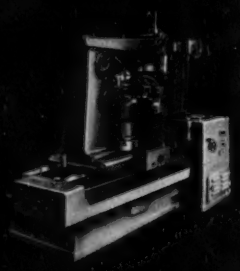

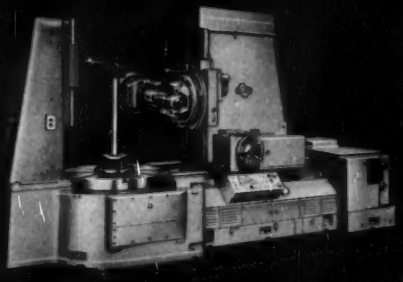

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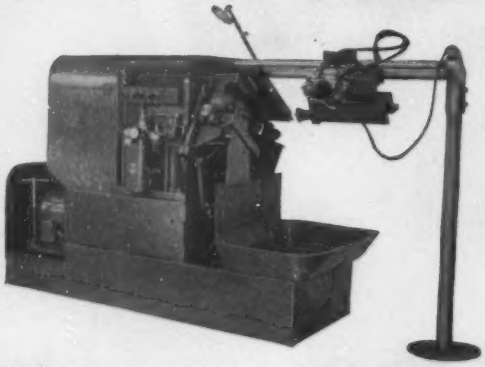

Cuts off longer pieces than regular automatic machine—*any length you want.* FAST cutting and chamfering of tubing, pipe, shafting. Check the following figures:

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Cuts and Chamfers both outside edges of ½" .035 wall tubing, 5" lengths, every 2.5 seconds.

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Cuts and Chamfers both ends, 20" long, at rate of 1 every 20 seconds.

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Modern Automatic Cutting-Off Machines available in 4 sizes, handling work up to 6¾" O.D.

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Cut and chamfered at one time—in 8 sec.—from 10 ft. length of stock already threaded (¾" U. S. Standard). Clean cut. Clean chamfer. Nuts start easily, with no extra finishing required.

MODERN MACHINE TOOL CO.
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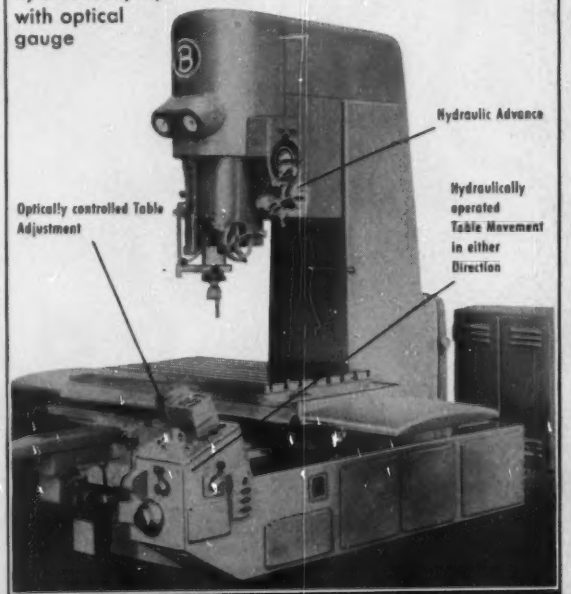
hydraulically operated – with optical gauge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The answer may well show up in *your* production costs. The surface finish on the part at the left was *controlled*, using a Brush SURFINDICATOR*, to meet specifications. The surface finish on the other part was *guessed at* and the part was overfinished, exceeding specifications. Cost data shows that furnishing a 32 microinch finish, where a 125 microinch finish would be satisfactory, *doubles* the machining cost.

You no longer have to guess at surface roughness and spend needless money in overfinishing. The Brush SURFINDICATOR permits you to measure surface roughness easily and quickly on the production line. Laboratory techniques are not required — your shop personnel can quickly learn to make accurate measurements after brief instruction.

TRY IT YOURSELF! Write for a copy of this booklet. It describes how surface finish control can reduce your machining costs, increase production capacity and help improve your products. Better yet, ask for a demonstration of the SURFINDICATOR in your plant, by a Brush engineering representative. Send coupon now. Brush representatives are located throughout the U. S. In Canada: A. C. Wickman, Ltd., Toronto. Brush Electronics Co., Cleveland 14, Ohio.

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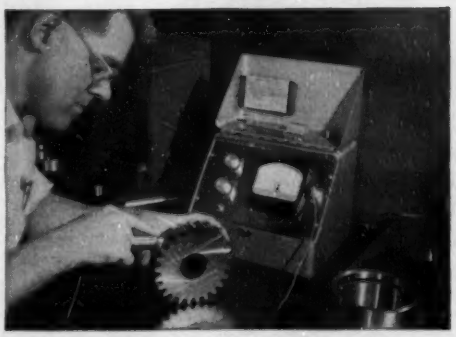

SURFINDICATOR* makes surface measurements easy!
The Brush SURFINDICATOR is easy to use, portable and accurate. It can be set up anywhere in the plant where 115 volts a.c. is available. The operator simply guides the pickup over the part, and reads surface roughness in microinches on the meter.

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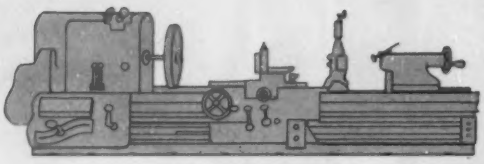
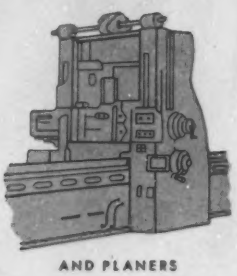
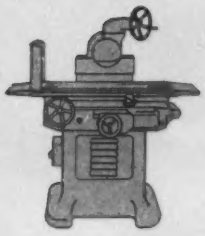


ALL TYPES OF LATHES...



AND PLANERS



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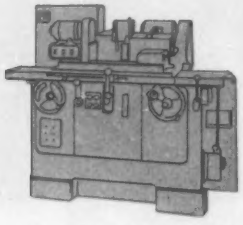
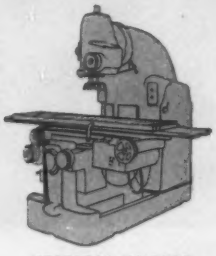
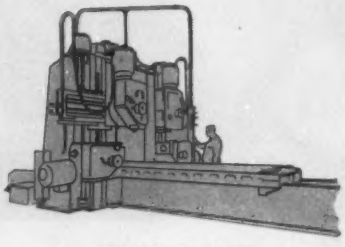


CYLINDRICAL GRINDERS



VERTICAL MILLERS



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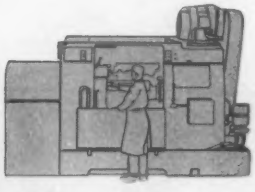
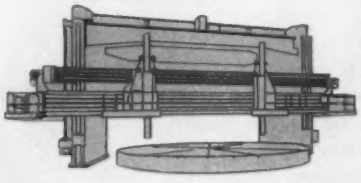
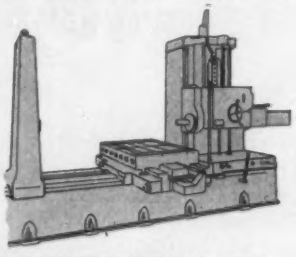


AUTOMATICS



VERTICAL BORING MILLS



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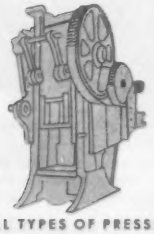
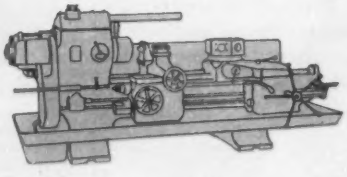
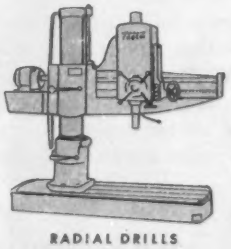


ALL TYPES OF PRESSES



TURRET LATHES



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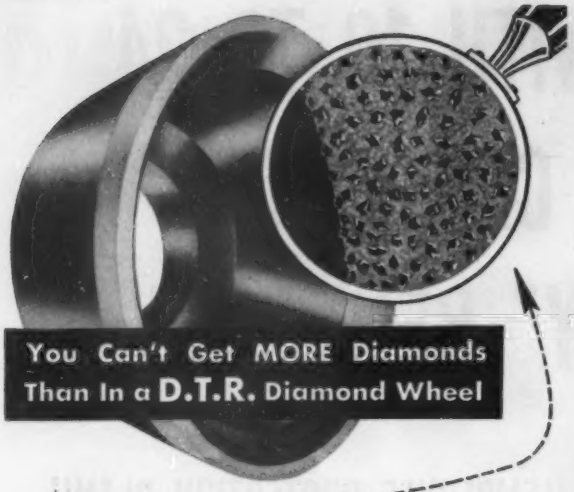

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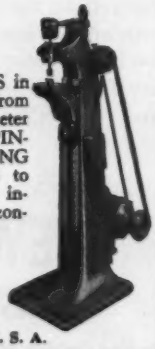

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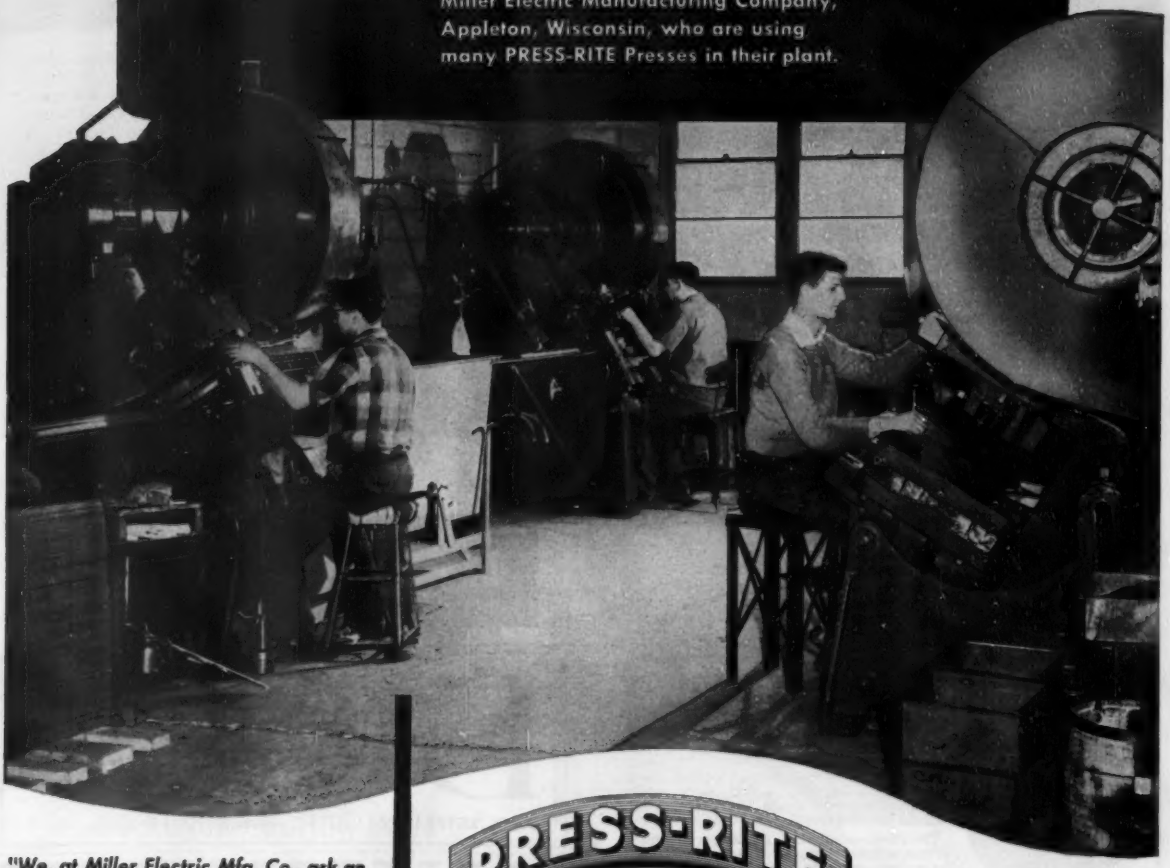
writes: A. E. Harrant, Executive Vice President, Miller Electric Manufacturing Company, Appleton, Wisconsin, who are using many PRESS-RITE Presses in their plant.



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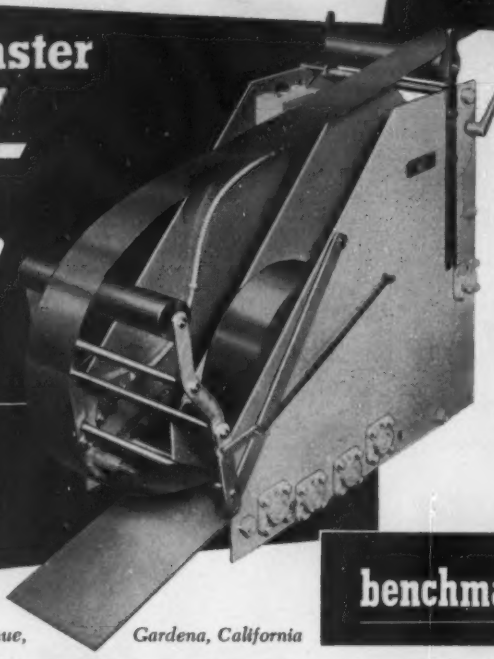

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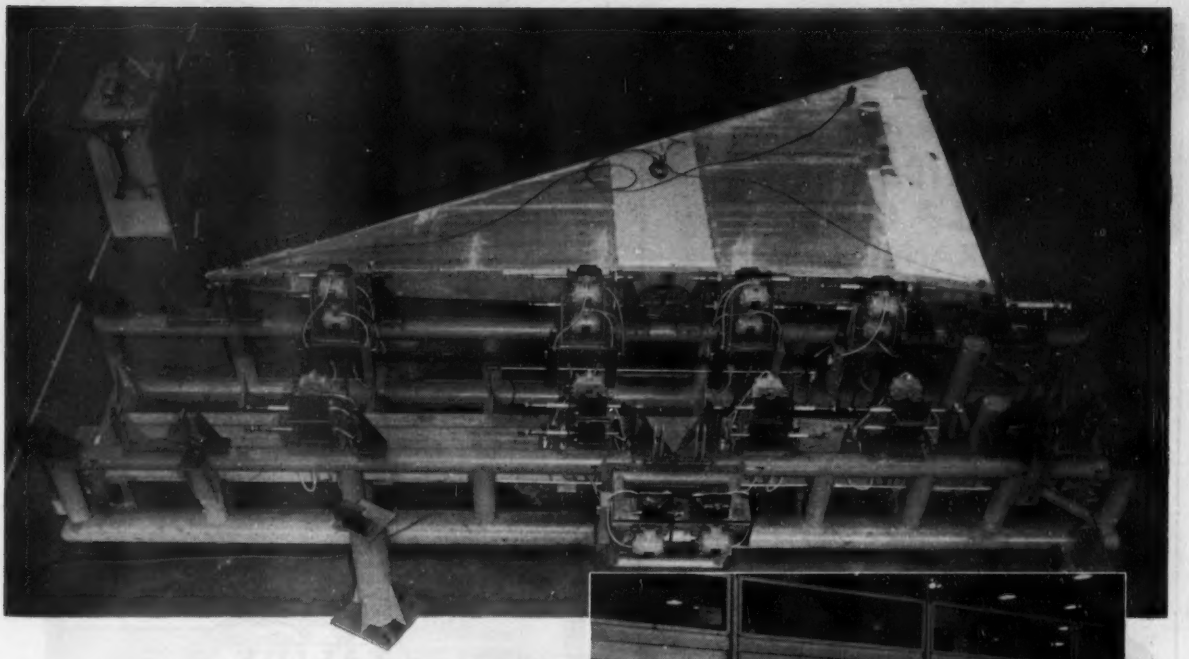

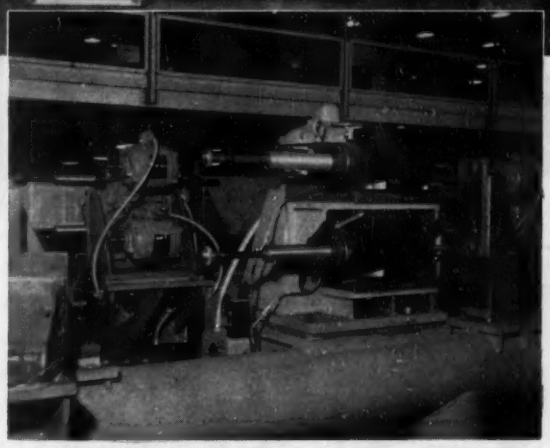

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THESE COMPACT new "packaged" Hydro-Borers let you build precision boring right into your production set-ups. This can solve big problems—as shown in the Convair wing job above. Sixteen Model S-6 Hydro-Borers and four special Hydro-Borers are mounted directly on the wing jig. These "packaged" units are stripped down to the patented Hydro-Boring unit and electric motor mounted on a simple base plate. All units shown are equipped with solenoid-actuated automatic trip and spindle return mechanism. The 16 units on the main jig bore wing mounting fittings, rough and finish boring in one pass. The 4 special units on the outriggers bore and face the landing gear fittings. Rough and finish bore are made in one pass and then the 3.75" diameter facing cut is made. All fittings are 75 ST.

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Above: Twenty Hydro-Borers mounted on Convair wing jig, designed by Far West Engineering Co., L.A., built by Hardman Tool & Engineering Co., L.A.

Inset: Close-up of "packaged" Hydro-Borer S-6 units.

●

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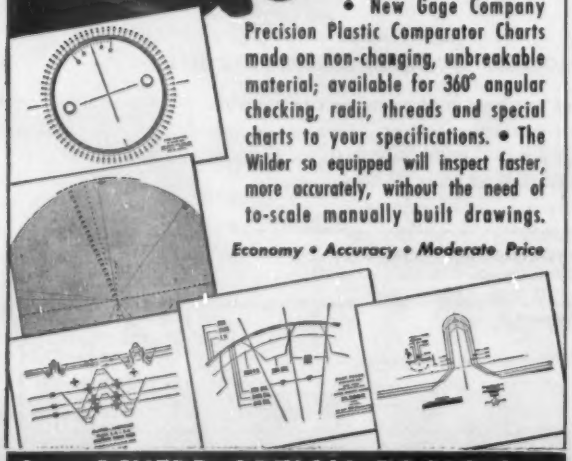

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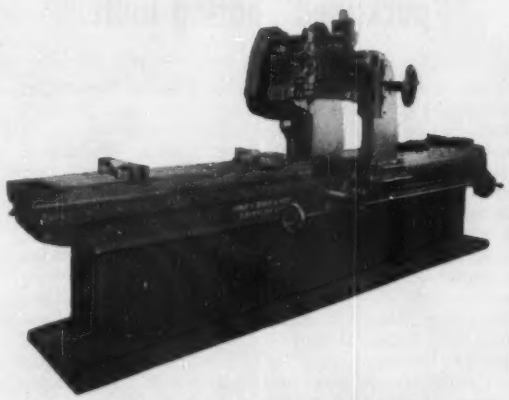
BURR KEYSEATERS

MILLING MACHINE, Planer Type



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Also Burr Portable Shaft Keyseaters in five sizes for hand, drill and motor operation.

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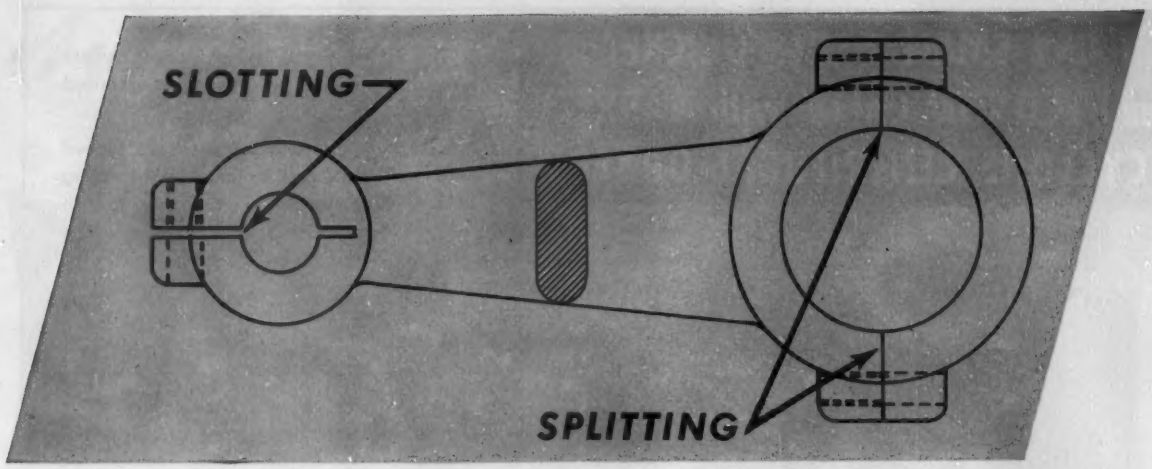
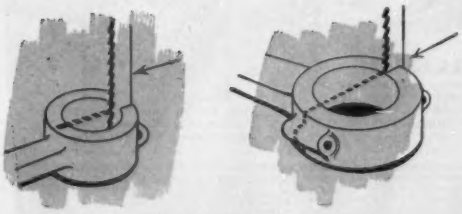


Here's a job for band machining!

THE OLD WAY

Slotting and splitting the part shown above would cost twice as much on a milling machine as on a DoALL band machine. And, use of the DoALL machine would free the much more costly unit for other work.



THE NEW WAY

For slotting, the band machine set-up time is less, cutting rate faster and tool cost lower than with milling.

Cutting at the rate of 4 to 6 or more square inches per minute the saw band makes short work of this splitting job.

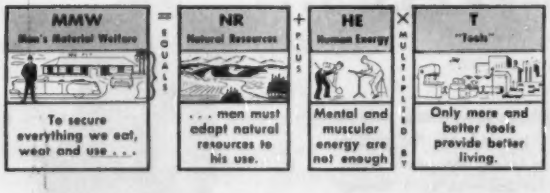
THIS is a representative part showing you two typical operations on which production band machining can cut costs a third to 50% or more. Slotting operations can usually be done best by power feed bandsawing. Splitting is another natural for this newest machining technique.

With the simplest fixtures to position the workpiece on the hydraulic power feed table, it is fed automatically into the continuous-cutting saw band. Upon completion of the cut the table automatically reverses.

Power feed, coolant system, wider speed range, greater power and new Demon *high speed steel* blades make new DoALL band machines amazing cost-cutters on production line operations.

Ask to see a free demonstration of production band machining at your plant. No obligation.

The DoALL Company, Des Plaines, Illinois.



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DoALL band machines, saw bands, precision surface grinders, granite surface plates, tool steel and precision measuring instruments are available through 38 DoALL Sales-Service Stores which also stock a complete inventory of cutting tools such as taps, reamers, twist drills, cutters and single point tools.

PB-5

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The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

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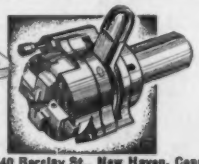
H&G Insert Chaser DIE HEADS



famous for accuracy and straightness of threads, low chaser costs, less downtime, more pieces per day.

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TWO MODELS
36" x 48" Table Size
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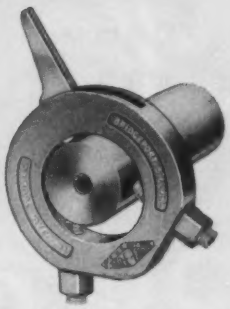

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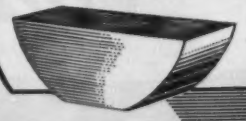

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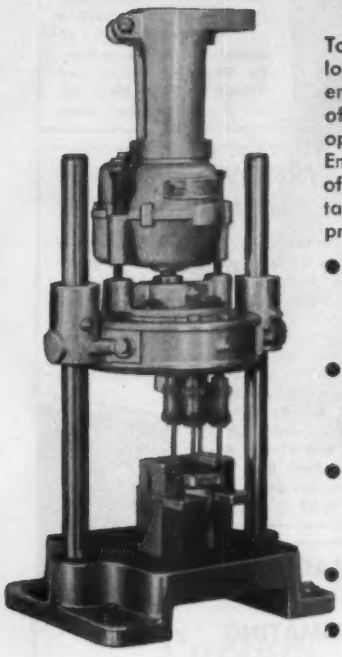
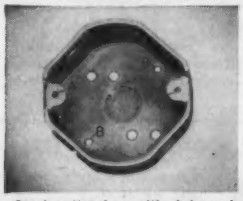


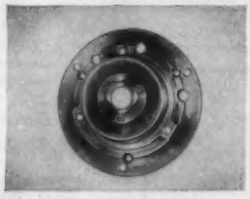
To put your small parts tapping and drilling on a low-cost, mass production basis you need specially engineered methods and equipment. Ettco's years of specialization in this field has led to the development and refinement of the Ettco-Emrick "Unit-Engineered" Multiple Head System, which is one of today's fastest, most economical methods of tapping and drilling small parts. Here's what it provides—

- *Multiple head and work holder engineered as a unit for your specific part to insure fastest handling and production with each stroke of the drill press.*
- *A selection of dozens of different standardized methods of handling a wide variety of shapes and sizes of parts and number and spacing of holes.*
- *Interchangeable tapping and drilling face plates to permit quick, easy changeovers from tapping to drilling — a patented Ettco-Emrick feature.*
- *A design that assures quick, easy installation on any make or model drill press.*
- *A limitless variety of spindle arrangements with capacities ranging from wire sizes to ⅝" in steel.*

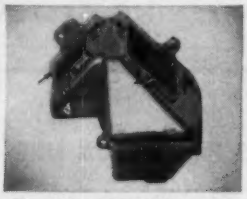
DO JOBS LIKE THESE FASTER, EASIER, AT LESS COST



Steel outlet box with 4 tapped holes. Production—12,800 tapped holes per hour with dual multiple head unit.



54 holes drilled and countersunk in one operation with a multiple head and electric indexing fixture.



Die casting with 6 holes — 3 in each of two planes — automatically positioned and tapped in one operation.

If your small parts production calls for multiple drilling, reaming, countersinking, tapping or threading — it will pay you to check with Ettco. Call in your nearest Ettco-Emrick distributor or send us a sample or drawing for recommendations and estimates.

FOR DETAILS, WRITE FOR BULLETIN No. 3

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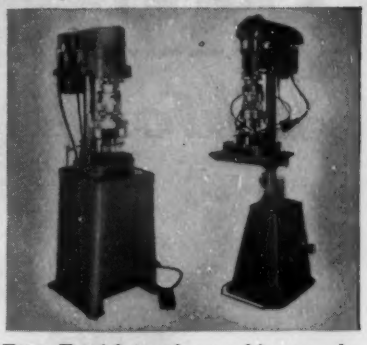
DRILLING and TAPPING EQUIPMENT NEWS

Tapping Machines Boost Multiple Head Output

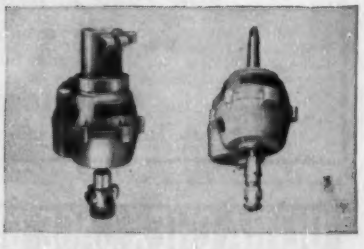


Ettco-Emrick tapping machines are designed for automatic or semi-automatic operation with multiple spindle drilling or tapping heads and single spindle tapping attachments. The No. 72A machine is foot or air-operated. The No. 74 machine is air operated and electrically controlled. *Details in Bulletins No. 72A and No. 74. Write Ettco Tool Co., 590 Johnson Avenue, Brooklyn 37, N. Y.*

Electric Indexing Fixture Has Fast, Precise Action

Ettco-Emrick Indexing Fixtures provide smooth, shockless, positive action. Can be used on any machine base. Synchronization of index fixture with outside machine member is electrically controlled. Utilizes interchangeable nesting plates ranging from 10" to 14" in diameter. *Details in Bulletin No. 97. Ettco Tool Co., Inc., 590 Johnson Ave., Brooklyn 37, N. Y.*

Tool Up Any Drill Press For Fast, Accurate Tapping



Ettco-Emrick tapping attachments can be mounted on any drill press. Newly patented friction clutch provides the delicate sensitivity needed for high speed tapping or threading. 7 different models for No. 6 to ¾" dies and for No. 0 to 1" taps. *Details in Bulletin No. 22. Write Ettco Tool Co., 590 Johnson Ave., Brooklyn 37, N. Y.*

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before it starts!

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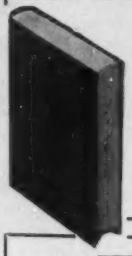

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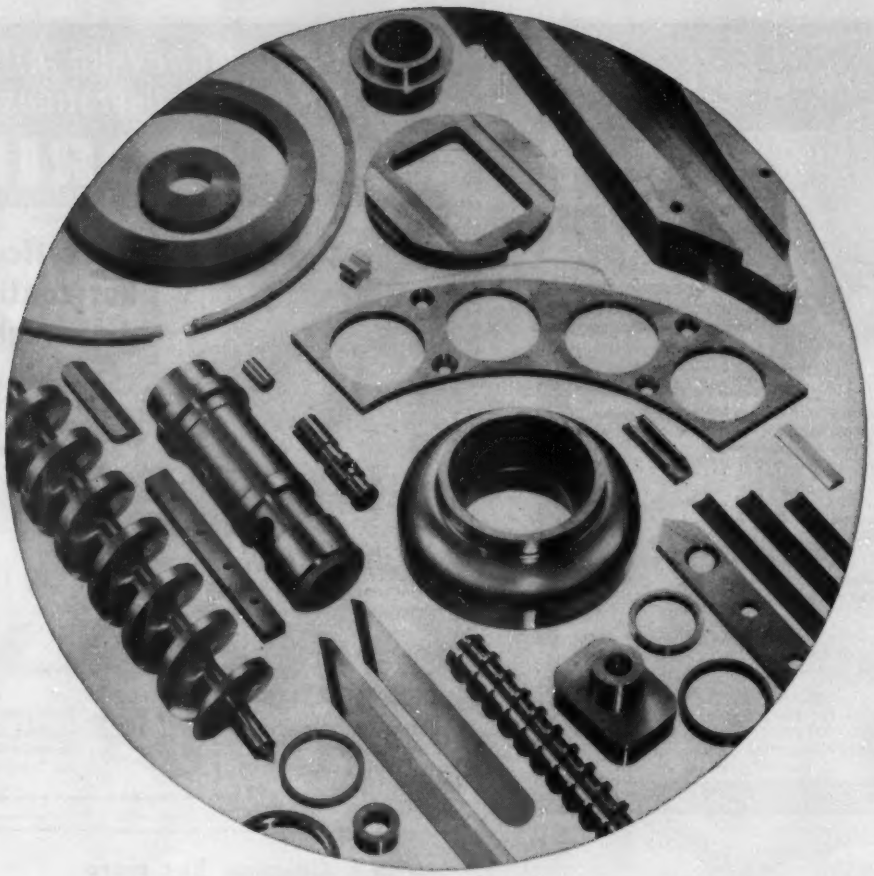

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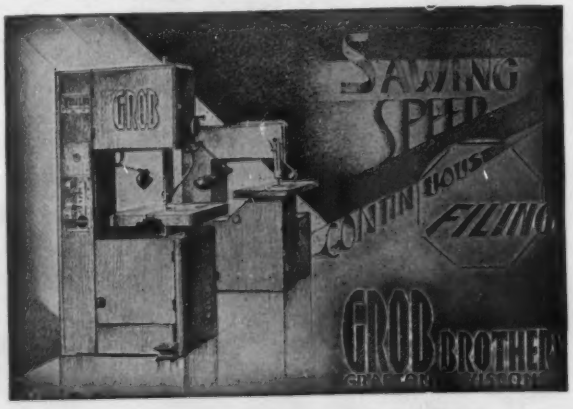

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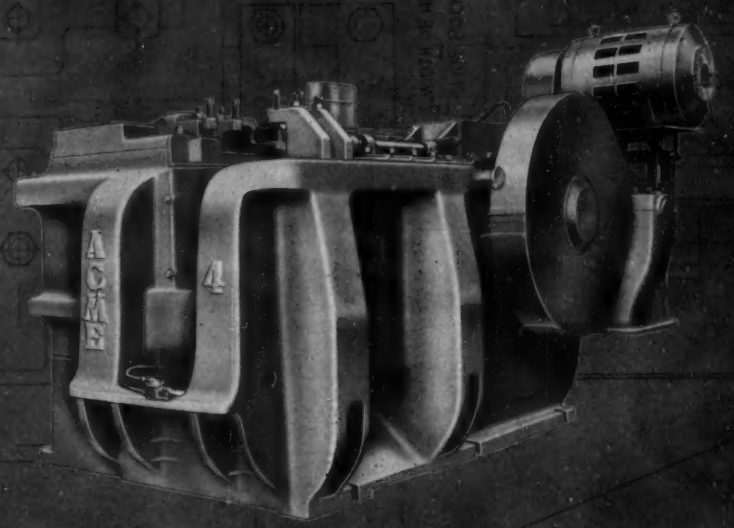

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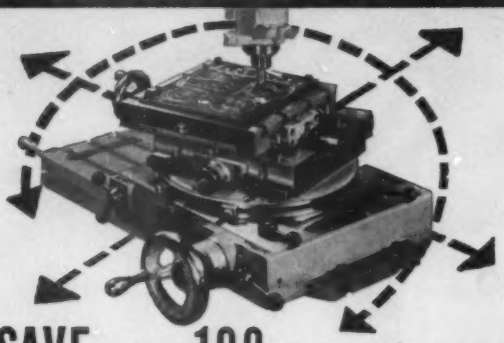

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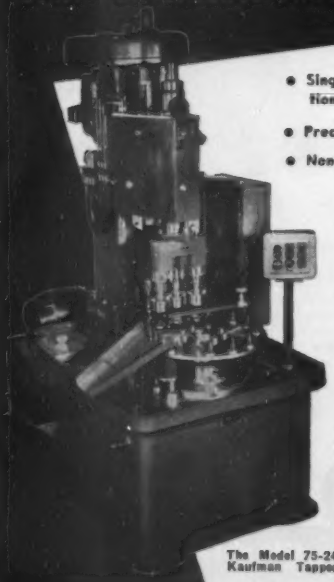

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- Pressure Lubricated Lead Screws
- Fast, Accurate Rugged Index
- Other Head Units Available
- And Many Other, Worthwhile Features

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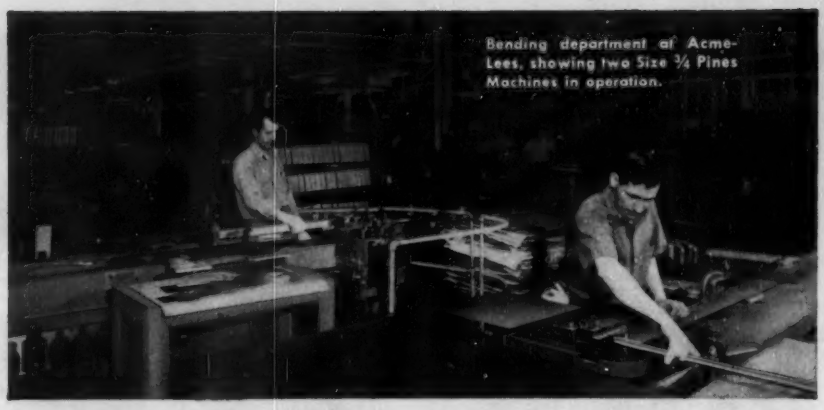


Bending department at Acme-Lees, showing two Size ¾ Pines Machines in operation.

Tooling for compression-bending stainless steel trim strips. First and fourth bends are located from a hinged stop on the swinging arm; second and third, from stops on top of machine.

Tooling for draw-bending brass trim molding to 85° on a 1⅜" radius. Three different sizes of molding are handled with this same tooling by simply adjusting the distance between bends.

SKILLFUL TOOLING PRODUCES SMOOTH 1½" RADIUS BENDS IN .020" TYPE 430 STAINLESS STEEL

Here's a typical result story indicative of the bending skill of Acme-Lees Division, Muncie, Indiana, specialists in fabricating decorative trim moldings and extruded shapes for Appliance and Automotive Manufacturers. On a Size ¾ Pines Automatic Bender, .020" Type 430 stainless steel trim moldings are now formed with four unusually smooth 90° bends to a 1½" radius. Production speed is today 58% faster than by former manual bending methods. Current production is rated at 456 bends per hour as compared to 288 by manual methods.

HYDRAULIC ACTUATION REDUCES SCRAP LOSSES

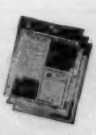
As shown, the tooling is accurately machined to fit the shape of the delicate molding. A bronze wiper shoe eliminates marring the exterior finish. The operator simply positions the workpiece and starts the hydraulic clamping and bending cycle by push button. The uniform, dependable hydraulic stroke of the Pines Bender assures fast, accurate bends which reduce scrap losses and simplify assembly problems.

INVESTIGATE PRODUCTION BENDING

If you have bending work with tubing, pipe, bars, extruded or rolled shapes, it may pay you to tool for production bending the "Pines-Way". Pines engineers will work with you on any bending problem without obligation.

WRITE FOR *Free* DATA SHEETS

Write for free copies of "Pines News" — illustrate actual bending applications, give details on tooling and cost-cutting production techniques on a wide range of work.



PINES ENGINEERING CO., INC.

Specialists in Tube Fabricating Machinery

672 WALNUT • AURORA, ILLINOIS

PRODUCTION BENDING • DEBURRING • CHAMFERING MACHINERY

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"it may never happen"

True—and let's hope it never does. But the moment when we're least expecting it would be the best moment for an aggressor to attack. And the atom bomb isn't the only emergency that may hit us. Fires, floods, explosions, tornadoes also strike with little or no warning. Be ready for disaster, whatever form it takes. Do these simple things TODAY:

- ☐ **Enlist the help of your local Civil Defense Director.**
- ☐ **Check contents and locations of first-aid kits.**
- ☐ **Send staff to Red Cross courses. They may save your life.**
- ☐ **Promote preparedness in your community. Your local CD Director can show you how.**

Set the standard of preparedness in your plant city—check off these four simple points NOW.

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With either new or used machine tool sales experience for one of the largest combination new and used machine tool dealers in New England. Drawing account and liberal commission arrangement, exclusive territory in New England. This position offers high earnings to the right man with pleasant working conditions. Write giving full employment background.

SW-4049, AMERICAN MACHINIST
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CHICAGO: 520 N. Michigan Ave. (11)
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Work Gloves, scientifically treated, like new, side split cowhide leather, gauntlet, all leather forefinger, knuckle back, tipped fingers, pull tab, lined lthr. palm, $6.50 dz. prs.

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AMERICAN MACHINIST
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Send drawings of prototype machine if possible.

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"C" Frame Press Model #11, 10-ton capacity

CLIFTON HYDRAULIC PRESS CO.
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WANTED

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One 12" 8-spindle, type "D" Bullard "Mult-Au-Matic" arranged for double index, with at least 2 double purpose heads and 2 compound heads.

Contact Louis Wozar or Kenneth Lung

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Stainless—Aluminum—Steel—Brass. Any size, type and quantity. Cash for termination inventories.

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WANTED

1—P & W 2-spin. No. 1B x 50" Deep Hole Driller.
1—Bliss No. 2W or 3W Wiring Press.

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CUTTER & TOOL GRINDERS
FELLOWS: Flat Top Helical Gear Cutter Grinder
OLIVER: 10" Template Tool Bit

DRILLING MACHINES
ALLEN: No. 2 Drill—6 Spindle, 8" overhang
ALLEN: #2½ High Speed 15"
BARNES: No. 210, 2-spindle, 21" Swing
PRATT & WHITNEY: ½B x 50 Deep Hole Drilling & Reaming Machine, 2-spindle
RADIAL DRILLS: Archdale, 5', 6' & 7', new

GEAR MACHINERY
FELLOWS: 61A & 64A Shaper, 18" dia.
FELLOWS: Flat Top Helical Gear Cutter Grinder
FELLOWS: Straight Line Generator, 3" dia. with many cutters
GLEASON: #12 Rough & Finish Gen.
SYKES: Rack Cutting Machine 12" to 36" length capacity (New)
INTERNAL GEAR GRINDER, GG-31

GEAR TESTERS
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical
FELLOWS: #12C Cone & Spacing Inspection Instrument
GLEASON: No. 3 Bevel Gear Tester
GLEASON No. 4 and No. 6 Bevel Gear Testers. Hand and Power
NATIONAL BROACH: SIC-12" Red Ring Gear Testing Machine

GEAR HOBBERS
CLEVELAND: #130 & 140 Rigidhobbers
REINECKER 60"
BROWN & SHARPE No. 44 20" cap.
LEES BRADNER 49A

GRINDERS—CYLINDRICAL
BROWN & SHARPE: No. 10 cap. 6"x18" plain
CINCINNATI: 6"x18" Hydraulic, Plain
LANDIS: 16"x32" Type "D" Crankpin, hydraulic, for grinding crankshafts
NORTON: 12"x18" Type C, Universal
NORTON: 10"x36", 30 Deg. Angle Wheel
NORTON: 10"x18" 45° angle wheel

GRINDERS—GEAR & SPLINE
GEAR GRIND MACH.: GG-19, 10"x24" Hydr. Spur Gears and Spines
GLEASON: #17, 23½" P.D.
PRATT & WHITNEY: 10" single and double wheel, hydraulic feed
INTERNAL GEAR GRINDER, GG-31

GRINDERS—INTERNAL
BRYANT: No. 5, 5Y, 16-6, 16-CP-16, 16-28, 24-L-36
HEALD: #50 Planetary
HEALD: #72A3 Sizematic
HEALD: #72A3 & #72A5 Extended Bridge

GRINDERS—RADIUS
VAN NORMAN: #73, capacity 7½"
VAN NORMAN: #649-16, cap. 6" to 16" dia.
VAN NORMAN: #3½" Un. Radius

HONING MACHINES
BARNES: Model 224, 4" dia. x 16" stroke
BARNES: Model 172, 2" dia. x 6" stroke
MICROMATIC: H-510 Double End Horizontal, ¾" to 2" dia.
MICROMATIC: H-2 Single End Horizontal, 2 spindle, ¼" to 1" dia.

LAPPING MACHINES
FELLOWS: 8 LSI and 13 LSI Gear Lappers, external and internal spur and helical

LATHES—PRODUCTION
BLOUNT: Polishing speed lathe 12" dia. x 48" centers
LODGE & SHIPLEY: #3A Duomatic, 25½" swing x 27" centers
POTTER — JOHNSTON: #4D Auto Turret

LATHES—TURRET
BULLARD: 36" Vertical turret
WARNER & SWASEY: #1A, #2A, #3, #3A, #4, #4A & #5
HERBERT: #0, #2, #4, #7, #8 and #9B/30 Sizes, new

LATHES—TURRET—*continued*
WEBSTER & BENNETT: Vert. 36" & 48" (New)

MILLING MACHINES
TAYLOR-FENN: M-80 Duplex Spline
RICE-BARTON: 4" Twin Spline
VAN NORMAN: 10CT Contour Miller, horizontal opposed spindle type for milling flat cams, also can be converted to similar work

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RUSSELL: 9½" cut-off Saw with Auto. Stock Feed (New) Hydraulic
RUSSELL: 5½" dia. cut-off saws, auto stock feed, hydraulic (New)
MOTCH & MERRYWEATHER: No. 3 Circular Saw with auto. stock feed
MARVEL: No. 6A Hacksaw, 6"x6"

THREAD MILLERS & TAPPERS
HALL PLANETARY: Mod "D" Thread Miller
LANDIS: 2½" single head horiz. threading machine
LEES-BRADNER: #40A Thread Miller
LEES-BRADNER: CT-36 Thread Miller chucking type, 13½" hole
MURCHEY: #22 Horizontal threading and tapping machine, ½" to 2½" dia. capacity.
NATCO: 16 spindle Tapper ⅝" cap.

MISCELLANEOUS
GARDNER: Model 84A Double Disc Grinder, 22" Wheel
MOLDING MACHINES, ROLLER JOLT: Osborne Model 2047-3
AUTOMATIC SCREW MACHINE, Wickman Single Spindle, 7/16" New
RACK CUTTING MACHINE: Sykes 12" to 36" length capacity (New)
CUT-OFF: Russell 5½" & 9½" cut-off saws with auto. stock feed (new) hydraulic
TEST STAND: Denison 918-AM Hyd.
HARDNESS TESTER: Grogan Brinell, 16-8
SHEFFIELD: Precisionaire Gauge
SUNDSTRAND: Double-End, #53, 42" & 60" Centering Mach.
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Heavy Duty, Ultra Precision
GEAR SHAVER

Model GCP with crowning attachment. 3"-24" P.D. 25½" Max. O.D. 2"-48" diam. pitch. 28⅞" max. length between centers. 3/16"-10" stroke. 6" max. when crowning. Can crown anywhere on 15" shaft. Can straight shave anywhere on 20" shaft. Dimensions 63" long x 67" deep x 100" high. Weight 12,200 lbs. New June 1952. Used 1,000 hours.

In perfect condition.

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WILMINGTON, MASS.
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USED MACHINERY

Columbia 10' Power Square Shear 3/16" cap.
Baush 44" Vert. Boring Mill 2 heads
Knight #40 Vert. Jig Borer
American 20"x8' Grd. Hd. Lathe motor in base
Landis 20"x72" and 18"x96" Plain Ext. Grinder
Hanchett 25 H.P. Sp. Vert. Hydr. Surf. Grinder 12"x48" table.
W & S No. 2-A Grd. Hd. Univ. Turret Lathe chucking.
Rivett No. 104 A.C. M.D. Internal Grinder.
Milwaukee Nos. 2-B & 3-B Horiz. Plain Millers D.O.
Cincinnati 36"x36"x18' D.H. Planer 2 Hds. Box Table.
Heald No. 72A-3 Hydr. Int. Grinder Rod Head Sp.
LeBlond 27"x12' Bed Grd. Hd. Q.C.G. Lathe 15" hollow spindle.
Cincinnati No. 2 Hi-Power S.P.D. Vert. Miller.
G & L 3" Bar Horiz. Boring Mill.
Barnes 20" All Grd. Camel Back Drill 1-Sp.
Blanchard M.D. Vert. Sp. Surf Grinder 20" chuck.
Campbell No. 213 abrasive cut off 1944.
Sundstrand 4-Sp. Vert. Rigidmill.
Heald #22 Ret. Surf. Grinder 12" chuck 1942.
Landis 2-Sp. 2" Cap. Bolt Threader M.D.
Hendey 16"x8' bed Q.C.G. Lathe 1939.
W & S No. 4 Ram Type Grd. Hd. Turret Lathe.
G & E 24" Gear Box Shaper Tilt. Table Top.
Newton 48" Table 1-Sp. Cont. Vert. Miller.
Foster 2-F Fastermatic Hyd. Turret Lathe.
Kompomith No. 2 Vertical Maximiller M.D.
Springfield Planer Type Surf. Grinder.
P & J #2 Auto. Prod. Miller, 2 Tables.
Foote-Burt #28 Box. Col. 1-Sp. Hvy. Drill.
L & N 8', 10' & 12' Press Brakes.
Bullard 24" & 30" Vert. Turret Lathes.
Lynd-Farquhar 20" stroke open-side Shaper Planer.

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REASONABLY PRICED

Capacity 3000 Tons—Platen Area 40"—Movable Top Head, Adjustable from 24" min. to 48" max.—Approx $5000 worth of Tooling.

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AUTOMATICS, 1⅞" 8 Spin. Conomatic
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72" King, P.R.T., M.D.
100" & 72" N.B.P., 2 hds., M.D.
3½" bar Defiance, Table (2)
4½" bar Sellers Floor Type
8" Bar Niles, Floor type
RADIAL DRILLS, 5'15" sel. Amer., Motor-on-Arm
GRINDER, 16"x96" Landis Hyd., Late
GEAR SHAPERS, Nos. 645AS, 61A & 61 Fellows
LATHES, 50"x30" Bed Niles, Late, Wet Hd.
16"x154" Con. Hendey, T.A., Tim.
14"x80" con. Amer. T.A.
SLOTTERS, 20"x24" & 12" Dill Labelle
30" Rockford Hyd. 1942

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Gleason 3" Str. Bevel Generator.
Ingersoll 36"x36"x12' Adj. Rail Mill.
B & S Nos. 2A & 3A Mills.

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Every Item Guaranteed as Represented

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27"x18' MONARCH "N" Geared Head Lathe, 11' centers, Taper Attach., Full Equipment, Late Type. 1942.

24"x12' BOYE & EMMES Timken Bearing, Geared Head, Lathe. Late Type.

27"x16' NILES, BEMENT, & POND Geared Head Lathe, 9' centers, M.D.

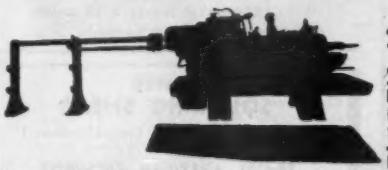
24", 36", 42" BULLARD Vertical Turret Lathe, New Era, Turret Head, Side Head, Motor Driven.

No. 601 W.D. OSTER Motor Driven Turret Lathe, 1½" capacity, Late.

1A WARNER & SWASEY Turret Lathe, Heavy Duty, Power Chuck Wrench, Timken Bearing, M.D.

No. 2, No. 3, No. 5, No. 3A WARNER & SWASEY Geared Head Turret Lathes, Bar Feed, Motor Driven.

24"x10' AXELSON Geared Head, Heavy Duty Model "E" 28" Actual Swing, M.D. Taper Attachment. 1942.



No. 7 BARDONS & OLIVER Universal Turret Lathe. 2½" capacity. Preselector Head, Late Type.

No. 00G BROWN & SHARPE High Speed Automatic Screw Machine, Motor Driven, Late type.

No. 1 LaPOINTE Motor Driven Horizontal Broach, 5 tons cap., 38" stroke.

50 HP. CHICAGO PNEUMATIC Air Compressor. Type NSB, 253 CFM, Piston Displacement.

10"x10" RACINE #30-C Hydraulic Heavy Duty Shear Cut Power Hack Saw, 1946.

10'x10 ga., 10'x¼" WYSONG & MILES Power Squaring Shears, Motor Driven.

10'x10 ga. CINCINNATI Power Squaring Shear, many extra features; NEW 1948.

#7A THOMAS open back Inclinable Press 80 Ton cap. Flywheel M. D. 1948.

600 ton NILES-BEMENT-POND Motor Driven Wheel Press, 86" between strain rods, 14' cap., 17" diam. ram.

#5, #7 JOHNSON O.B.I. Presses. 56, 79 tons cap. M.D. Flywheel & Geared Type.

MILLING MACHINES

#2-18 CINCINNATI Plain Auto. Milling Machine, M.D. Late Type.

#2 KEMPSMITH Horiz. Maxi-Mill, Motor in base, Vert. Head.

#08 CINCINNATI Vert. Mill, Plain & Rotary Table Type.

#3B KEARNEY & TRECKER Vertical Milling Machine, Motor in base.

No. 0-8 CINCINNATI Rise & Fall Horiz. Mill, Late Model.

No. 3B KEARNEY & TRECKER Horiz. Mill, Double Overarm, Motor in base.

No. 2M CINCINNATI Universal Horizontal Mill, Full Equipment, M.D.

96" x 86" x 28' NEWTON PLANER TYPE MILLING MACHINE. 2 Heads on Rail; 2 Side Heads; Pendant Control; Late Type; Inspect under power.

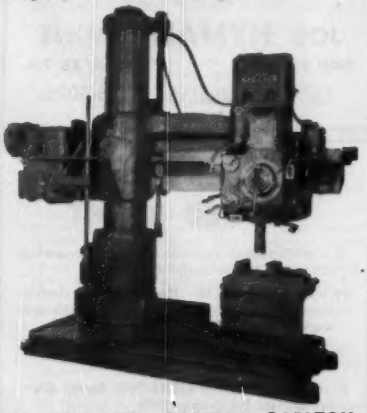
DRILLING MACHINES

4'x15" Column CINCINNATI-BICKFORD "Super-Service" Radial Drill, Motor on arm, Box table.

No. 262 BARNES Motor Driven Sliding Head Drill Press. 2" cap. in steel. 1941.

No. 2 M.T. Six Spindle ALLEN Type KH Drill Press, Individual Motor Drive, Late Type. 1943.

No. M200 DEFIANCE Prod. Drill, 2" cap., #5 M.T., 26" swing. 1942.



4' ARM, 15" COLUMN CARLTON RADIAL DRILL. 48 SPINDLE SPEEDS 15-1500 RPM. MOTOR ON ARM. 1943.

½, 1½ BUFFALO FORGE Universal Ironworker, Notcher and Coper, M.D.

6'x¼" VERSON Power Press Brake, 8' overall, late type. 100 Tons Cap. 1942.

GRINDERS

12"x36" LANDIS Universal Cylindrical Grinder, Excello Internal Spindle, M.D.

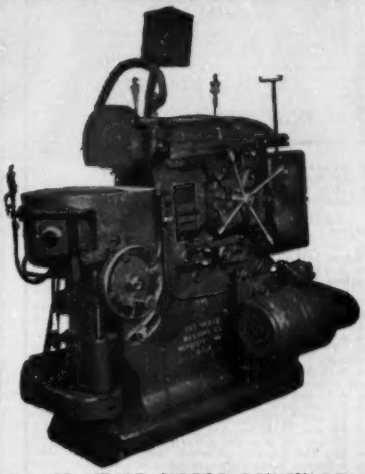
6"x18" LANDIS Type "C" M.D. Hyd. Cylindrical Grinder, Serial #29196.

6"x18" NORTON Vertical Hydraulic Surface Grinder, complete with magnetic chucks, coolant systems, Late.

#TG615 JONES & LAMSON Thread Grinder, Late, M.D. and TG848.

No. 208 BESLEY Motor Driven Disc Grinder, 26" wheels, Late Type.

12"x36" MATTISON M.D. Hydraulic Surface Grinder, 15 HP Spindle Motor.



No. 22 HEALD MOTOR DRIVEN ROTARY SURFACE GRINDER. 12" Magnetic Chuck. Late Model.

20", 24", 28" GOULD & EBERHARDT V-Ram Shapers. M.D.

No. 194 BARNES Vertical Hone, 4" capacity, 12" stroke. Motor Driven.

30 K.W. LEPEL High Frequency Induction Heater.

No. 8LS FELLOWS M.D. Gear Lapping Machine. With Detachable Head, Universal Work Support.

No. 20, WATERBURY FARREL Thread Roller, ⅜" cap., 1944.

15' x 10' x 36' BETTS PLANER, DOUBLE HOUSING, BOX TABLE, 2 Swivel Heads on Rail; 2 Swivel Side Heads; Pendant Control Variable Speed Main Drive Motor, 75 HP. Inspect under power.

OVER 1000 MACHINE TOOLS AVAILABLE IN STOCK • SEND US YOUR INQUIRIES

LATE MODEL GUARANTEED MACHINE TOOLS

BORING MACHINERY
Model 61 Excello 6-spindle cyl. borer, 1946
42" Bullard New Era vertical T/L
3½" Bar No. 32 Lucas, horizontal, table type
36" Rogers vert. T/L side head, new 1942
36" Bullard vert. T/L, side head, #11325
72" Niles Bement Pond 2 heads, PRT, #17623
No. 48 Heald Borematic precision late type

DRILLS, RADIAL
3½ ft. arm 8" column American sensitive
4' arm 13" col. Carlton M.O.B.
9 ft. arm 16" column American, late type.

GEAR HOBBERS
No. 12H Gould & Eberhardt universal
No. 36H Gould & Eberhardt universal
72" Bohnchardt & Schutte universal

GEAR MACHINERY, MISC.
10" Pratt & Whitney hyd. gear grinder, 1944
12" Model 224 Illinois involute profile measuring machine, new 1943
13" Model Sheffield gear chamferer, 1947
No. 3 Barber Colman auto. hob sharpener, 1944
Nos. 71A, 75A, 712 and 715 Fellows HS shapers.

GRINDERS, CYLINDRICAL
4"x18" Cincinnati pl. hyd., plunge cut, 1946
10"x18" Norton types BA, A C, late models
10"x18" Cincinnati Silmatic, type ER (2), 1941-1946
16"x36" Norton type C hydraulic (2), 1943
14"x36" Landis type C, hydraulic (2), 1946
16"x36" Norton type C, hydraulic (2), 1943
16"/26"x72" Norton type C, hydraulic, 1945
16"/40"x120" Landis gap type, hydraulic, serial 16193
16"/48"x96" Landis gap type hydraulic, new 1941

GRINDERS, SURFACE
16A2 Blanchard rotary surface, serial 6046, new 1946.
6"x18" Norton vert. spdl. hydraulic, 1942
8"x22" No. 5 Abrasive, motor in base (2)
12"x48" Model 300 Hanchett vert. spdl. 1946
14"x36" Pratt & Whitney vertical surface grinder, 1942.
72" No. 72 Hanchett rotary surface, 1946

GRINDERS, MISC.
No. 2 Cincinnati univ. tool and cutter, new 1942
No. 13 Brown & Sharpe universal tool, new 1942
No. 2 Cincinnati cutter grinder, late model
30" Ingersoll cutter grinder, late model

INTERNAL GRINDERS
Nos. 72, 72A3 and 72A5 Heald
No. 5 Bryant semi-automatic chucking
No. 2 Cincinnati centerless (3), 1942-1943
No. 49 Van Norman radius, 1945

LATHES, ENGINE
14"/28"x36" centers Smith-Drum, gap, 1945.
14"x42" Hendey G.H., M.I.B., 1940
24"x14 ft. bed American G.H., G.C.G., serial 44070
52"x30 ft. bed Niles Bement Pond G.H., like new

LATHES, MFG. & MISC. & TURRET
17"x72" LeBlond Rapid production (5), 1946-1947
No. H5 Libby International saddle type universal turret lathe, 1940
No. 5 Jones & Lamson Universal ram type turret lathes, (2) late models

MILLING MACHINES
No. 2 Brown & Sharpe vertical
No. 2 Cincinnati Hi-Power plain horizontal
No. 4 Cincinnati Hi-power plain horizontal
No. 5 Cincinnati Hi-power plain horiz., vert. attach.
No. 2-16 Cincinnati production mill, late
1-12 Cincinnati production miller
No. 4-36 and 4-48 Cincinnati Hydromatic production
No. 2 Cincinnati high speed dial type plain
No. 2B and 3K Milwaukee universal
No. 3B and 3K Milwaukee universal
No. 3B and 4K Kearney & Trecker plain, late type
No. 22L Van Norman universal, 1943
No. 6 Becker heavy duty vertical
24"x24"x12 ft. Ingersoll adj. rail planer type mill, tracer controlled, 1945
30"x21"x12 ft. Ingersoll fixed rail planer type mill
42"x42"x18 ft. Ingersoll adj. rail double housing mill, 2 S.H. and 1 R.H. power on rail and head
42" Ingersoll 3 spindle rotary continuous mill
42" Ingersoll 2 spindle rotary continuous mill
43"x20"x20 ft. Ingersol fixed rail double faced planer type mill
60"x48"x16 ft. Ingersoll adj. rail double housing planer type mill, 2 S.H. and 2 R.H.
72" swing 64" table Ingersoll 2 spindle rotary continuous mill, timken bearings.

PRESSES
105 Ton No. 7½ Verson O.B.I. (2)
200 Ton No. 25 Bliss embossing
300 ton No. 1039 Hamilton S.A., D.C.
400 ton No. 608 Toledo knuckle joint
100 Ton No. 93C Toledo SS, DC, air cushion
250-ton EGS3 Ferracute Knuckle Joint coining
2 to 70 ton Ferracute punching (several)
3 to 60 ton O.B.I., most every make
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36" Rockford vert. hyd. slotter, 1942

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Barnes #172 Hydra Hone
16"x36" Model C Pratt Whitney Lathe 1946
#3 Gleason Straight Bevel Generator
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- TG636 Jones & Lamson Precision Thread Grinder, 1942
- HP-100 La Pointe 50 Ton Broach, 1945

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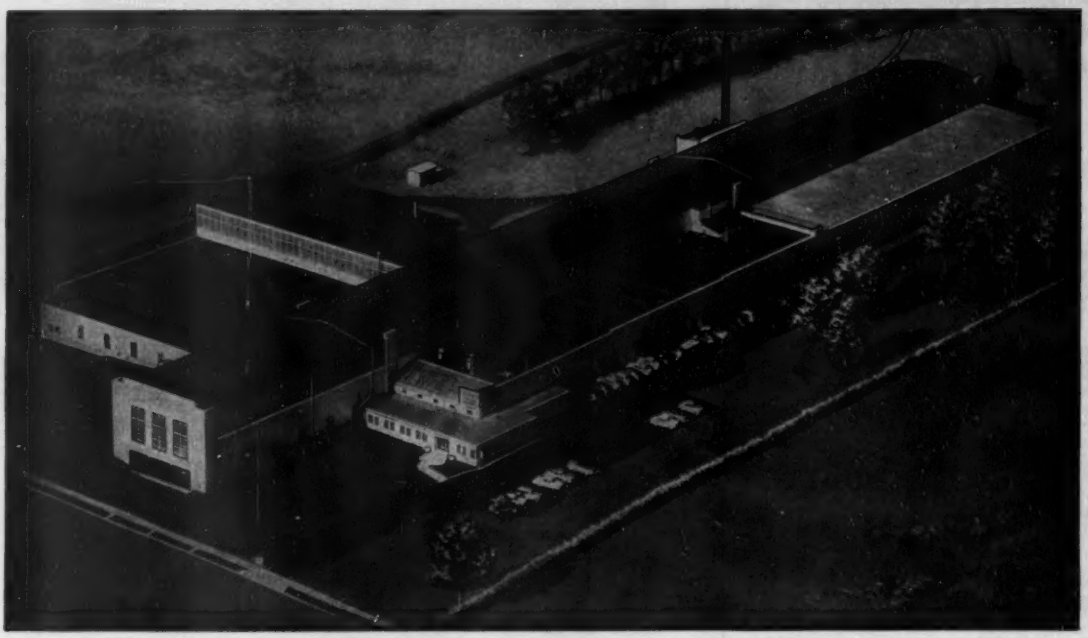

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Gorna "Copyter" Duplicating Attachment, m.d.
Model TR 50 Hardinge High Speed Production Lathe, m.d.
12"x6' Lodge & Shipley Geared Head, m.d., taper
12"x84" centers Lodge & Shipley Geared Head, m.d., taper
14"x61½" centers American Geared Head, m.d.
14"x30" centers Bradford Lathe, Timken
14"x6' American High Duty Geared Head, m.d., taper
14"x6' Hendey Geared Head, m.d., taper
14"x8' Lodge & Shipley Geared Head, m.d.
14"x6' Pratt & Whitney, cone
14"x6' LeBlond, cone
14"x6' LeBlond, Geared Head, s.p.d.
14"x6' bed Monarch, cone, motorized
14"x6' Sidney Geared Head, m.d.
14"x6' Springfield Geared Head, m.d., taper
14"x8' Sidney Geared Head, m.d.
14"x8' Prentice, m.d., taper
16"x30" centers Monarch, m.d., taper
16"x6' bed Cisco Geared Head, m.d.
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Yoke Head, taper
16"x6' Lehmann Geared Head, m.d.
16"x6' Lodge & Shipley Selective Head, m.d.
16"x6' bed Monarch Geared Head, m.d.
16"x8' Monarch, cone, motorized
16"x12' bed LeBlond Geared Head, m.d., taper
16"x14' Monarch, m.d., taper
17"x6' LeBlond Geared Head, m.d.
18"x5' LeBlond Geared Head, m.d.
18"x6'6" bed Gravoco-Klusman Geared Head, m.d.
18"x96" centers Sidney, m.d., timken, late
18"x7' Hendey Geared Head, m.d., taper
18"x8' bed American Geared Head, m.d.
18"x8' Hendey Geared Head, m.d., taper
18"x8' Lodge & Shipley Geared Head, m.d.
18"x8' Whitcomb-Blaisdell Geared Head, s.p.d.
18"x8'6" bed Walcott, cone, motorized
18"x10'6" bed Boye & Emmes, cone, motorized
19"x4' centers LeBlond, H.D., m.d.
19"x6' bed LeBlond Geared Head, m.d., later type
19"x10' bed LeBlond Geared Head, m.d.
19"x16' bed LeBlond Geared Head, m.d.
20"x8' bed Cisco, cone, motorized
20"x8' bed Gravoco Klusman Geared Head, m.d. in log
20"x8' bed Boye & Emmes, m.d.
20"x8' bed Lodge & Shipley Geared Head, m.d., taper, late type
20"x10' Sidney Geared Head, m.d.
20"-40"x9' bed Rahn-Larmon Gap Lathe, cone, motorized
20"x10'6" Boye & Emmes, cone, motorized
20"x10'6" bed Sidney "Tritrol" Geared Head, m.d., late
21"x8' bed LeBlond Geared Head, m.d., taper
23"x12' bed LeBlond, cone, motorized
24"x12' LeBlond Geared Head, m.d., taper
24"x12' bed Boye & Emmes, belt drive
24"x12' Bridgeford Geared Head, m.d., taper
24"x13' bed Lehmann Geared Head, m.d., taper
24"x16' bed Lodge & Shipley, cone, motorized
24" Raised to swing 32"x22' bed—18' centers New Haven, cone, taper
25"x10' bed LeBlond Geared Head, m.d., taper
30"x10' bed Betts-Bridgeford, m.d.
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30"x13'6" bed Niles-Bement-Pond, m.d.
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30"x40' bed (33' centers) Betts-Bridgeford Heavy Duty Hollow Spindle "Oil Country" type, m.d.
36"x84" centers American "Super-Productive", m.d.
36"x16'6" bed Boye & Emmes Geared Head, m.d.
36"x18' Putnam, m.d.
38"x17' centers American Super-Productive Geared Head, m.d.
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42" raised to swing 36"x20' bed Lodge & Shipley, m.d.
42"x14' bed American Geared Head, m.d.
42" Putnam raised to swing 56½x20' bed Geared Head, m.d., 11'8" centers
48"x33' centers Niles-Bement-Pond, m.d.
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No. 3 Lodge & Shipley Duomatic, m.d., late type
No. 3 Niles-Bement-Pond Axis Lathe, m.d.
Model 81 Blount Speed Lathe, m.d.
W. C. Lipe Carbo Semi-Automatic, m.d., late
W. C. Lipe Carbomatic, m.d.
Colborne Mfg. Bench Type Speed Lathe, m.d.
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8x132" LeSwing, m.d., latest
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12x16" centers Monarch Model 5T, m.d.
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100" Niles-B-Pond Vert. Bor. Mill.

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No. 2 Avey Cam Fd. Drill. 14" Swing.
No. 2 MA-6 Avey 24"-1-Spdl.
2 Spdl.—24" SW.—No. 3 Avey.
No. K60H Fox 16 Spdl. Multi Drill.
No. 2—20" 2-Spdl. Leland-Gifford LMS
No. LBM—20" 3 Spdl Leland-Gifford Drill.

GEAR MACHINES
11" Gleason Gear Generator.
No. 12HS Gould & Eberhardt.
No. 36-BM G. & E.—3 spdl. Rougher.
615-A Fellows Gear Shaper.
612-A Fellows Gear Shaper.

GRINDERS
No. 214 Besley Double End Disc Gdr.
5"x30" Cam-o-matic (1946).
6"x18" Norton Type C Plain (1943).
10"x36" Norton Type C Grinder.
10"x36" Norton Type C Cam Grinder.
10"x48" Norton Type C Pl. (1943).
No. 4 Cinn. Hi-Speed Dial Type Pl. (1944)
TG 615 J & L Thrd Gdr.
B24-25" Chuck Arter Surf.
No. 5 Bryant Internal Grinder.
No. 5B Bryant Internal Grdr.
No. 16-16 Bryant Int. Grinder.
No. 16-28 Bryant Int. Grinder.
No. 16 A-28 Bryant Internal Grinder.
No. 16-38 Bryant Int. Gdr.
No. 24-26 Bryant Int. Grinder.
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Model 200-H5-Dbl. End Micro. Horiz.
Model H-7 Micromatic Vert. Hone
No. 224 Barnes Vert. Hone
No. 306-H Barnes Vert. Hone.

LATHES
R-14 Seneca Falls Lo-Swing Lathe. (16"x33")
12"x21" Fay Auto.
12"x36" Fay Auto.
18"x6' Am. Geared Head Lathe.
27"x12' American Geared Hd. Lathe.
36"x18' Putnam Grd. Hd. M.D.
No. 2 Warner & Swasey Geared Head Tur.
No. 3 Warner & Swasey Bar Feed Turret.
No. 5W Acme Tur. Lathe (Late).
No. 3AL Gisholt, Cross-Slide Turret.
No. 4A Warner & Swasey Turret.
No. 6 Warner & Swasey, cone head, Turret.
2¼"x24" Jones & Lamson, turret.
3H-10 Libby International, 29" Sw.
18" Libby, M.D., turret.
No. 4A Warner & Swasey (1944).

PLANERS
48"x36"x14' Gray, 2 Heads.
48"x48"x12' Cincinnati, 2 Heads.
60"x48"x27' American, 4 Heads.

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No. 08 Cincinnati Vert. (1942).
4" Taylor & Fenn Duplex Spline.
10"x48" Hanson-Whitney Thrd. Mill.
10"x60" Pratt & Whitney Thrd. Mill.
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Gould & Eberhardt 96"x30" Automatic Spur and Helical Gear—Aux. table—All power feeds—Feed, index and cutter speed gears—MD

Pfauter #5 Automatic Spur, Helical and Worm Gear Generator—Max. cap 118"x22" face—End milling attch. for herringbone gears—Feed, lead and index gears—MD

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GRINDERS

Norton 6"x18" Type C Cylindrical—Plunge cut—Extra table for cam shaft grinding—Late

Landis #4H Plain Hydraulic—Cap. 4"x12"—Hydraulic infeed and timer—Coolant—MD—Late

Norton 14"x72" Hydraulic Universal Type C—MD—Late

Landis 10"x48" Hydraulic Plain Cylindrical—Type C—MD—Late

MILLERS

Milwaukee #4K Vertical—Range 42"x14"x20"—MD—Late

Milwaukee #2H Sliding Head Vertical—Range 28"x12"x15"—Speeds to 1400 RPM—MD

Milwauke #2KM Double Overarm Universal—Dividing head—Range 28"x10"x17"—MD—Late

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HEALD No. 48A single end Baromatic; M.D.
HEALD No. 49 double end Baromatic; M.D.

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BULLARD 24" & 54" spiral drive, M.D., late type
NILES 53", 2 swivel heads, PRT; M.D.
NILES 100" 2 swivel heads, PRT; M.D.
SELLERS 144", 2 swivel heads on cross rail; PRT

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COLONIAL VGI-10-48 Vertical; Hydraulic; late
LAPOINTE 10-54" Vertical, Model SRV; new 1947
OILGEAR 3XA horizontal; cap. 20,000 lb; 56" stroke; hydraulic; late type
OILGEAR type XL-6 single ram; late type.

DRILLS

AMERICAN 4' arm 11" col. "Hole Wizard", late
AMERICAN 5' arm 11" col. "Hole Wizard", late
AMERICAN 5' arm 13" col. "Hole Wizard", late
BARNES #201-½, 4 spindle, M.D., late type
BARNES H-2 Hydram, 2" capacity; M.D., late type
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FELLOWS No. 6Z2 High Speed Gear Shaper; late
FELLOWS No. 7A High Speed Gear Shaper; late
FELLOWS No. 7S High Speed Gear Shaper; late
FELLOWS No. 13LS Lapper; motor drive, late

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GLEASON No. 4 Tester; late type
GLEASON 11" Straight Bevel Gear Gen.; M.D.
GLEASON No. 7 Hyp. Cutter Sharp; latest type
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GLEASON No. 13 Hyp. Cutter Sharpener; late
GLEASON 12" Spiral Bev. Cutter Sharpener; M.D.
GLEASON 12" Straight Bevel Generator; late
GLEASON No. 14 Spiral Bevel Hyp. Gear Grinder
GLEASON No. 15 Quenching Press; late type
GLEASON No. 17 Spiral Bevel, Zarol and Hypoid Gear Grinder, M.D., late
GLEASON 18" Straight Bevel Gear Gen.; M.D.
GLEASON No. 18 Gear Tester and Lapper; M.D.
GLEASON No. 20 Spur Gear Tester; latest type
GLEASON #22 Hypoid Formate Gear Finisher; late
GLEASON 24" Bevel Gear Planer; motor drive
GLEASON 25" Straight Bevel Gear Gen.; M.D.
GLEASON 37" Bevel Gear Planer; M.D.
GLEASON 25" Spiral Bevel Gear Gen.; M.D.
GLEASON No. 6 Revacycle 5" cone distance; late

GRINDERS, Cyl. Plain & Univ.

CINCINNATI 14"x72" Universal; M.D., late type
CINCINNATI 6"x18" Plain, "Fimatic"; late type
LANDIS 10"x18" type C Plain, Hydraulic, late
LANDIS 14"x36" type DC plain hydr. with infeed; late
NORTON 4"x12" Model CTU Plain, year 1953
NORTON 6"x18" Type "C" Plain; late type
NORTON 16"x72" type "C" Plain; late type

GRINDERS, Internal

BRYANT #5, #16-C-16 Hydraulic; late type
BRYANT #24-36" Hydraulic; late type
HEALD #70A Int. M.D., late type
HEALD #81 Plain chuck type; New 1947
HEALD #72A3 Plain & "Gagomatic"; late type

GRINDERS, Surface

ABRASIVE #34, 6"x24" table; late type
HEALD #22 Rotary, 12" chuck; M.D., late

LATHES, Turret

GARDONS & OLIVER #5 Univ. Ram Type; late
GISHOLT #1L and #2L Saddle type; Timken; late
GISHOLT #3 Universal ram type; M.D., late
MOREY #2, #3, #4 ram type; Timken; latest type
WARNER & SWASEY #1-A Universal; Hex., late
WARNER & SWASEY #2 Geared Head; late
WARNER & SWASEY #3 and #5 Univ. ram type

LATHES, Engine & Mfg.

HENDEY 24"x36" centers; M.D., late type
LeBLOND 36"x204" Heavy Duty; PRT; Timken; late
LeBLOND 42"x100" H.D., Timken; M.D., late type
LODGE & SHIPLEY 12"x30" C.H. Toolroom
LODGE & SHIPLEY 14"x30" centers; late type
MONARCH Model EE 10"x20" Toolroom; late
MONARCH 12"x30" centers; Model CKK; late type
NILES 30"x50' bed, single end boring, "Time Saver"
PRATT & WHITNEY 16"x30" centers; Timken
REED PRENTICE 14"x54" Model B, Timken, late
SUNDSTRAND 60" centers; auto Type B; late

MILLING MACHINES, Plain

BROWN & SHARPE #2 M.D. late type
CINCINNATI 1-10 Production; Timken; late type
KEARNEY & TRECKER 2H, 2HL & 4H, M.D., late

MILLING MACHINES Thread

HALL Style "D" Planetary; late type
LEES BRADNER Model #LT 6"x36" #HT 12"x24" and #HT 12"x36" centers; late type
MOREY 12"x30" and 12"x160" centers; late type

MILLING MACHINES, Universal

BROWN & SHARPE #2 Universal Miller; late type
CINCINNATI 2MH Univ., motor drive, late type
CINCINNATI #3 Dial Type, Timken, M.D., late
KEARNEY & TRECKER #3K; Timken; late type
VAN NORMAN #22L, #26 and #36 ram type; late

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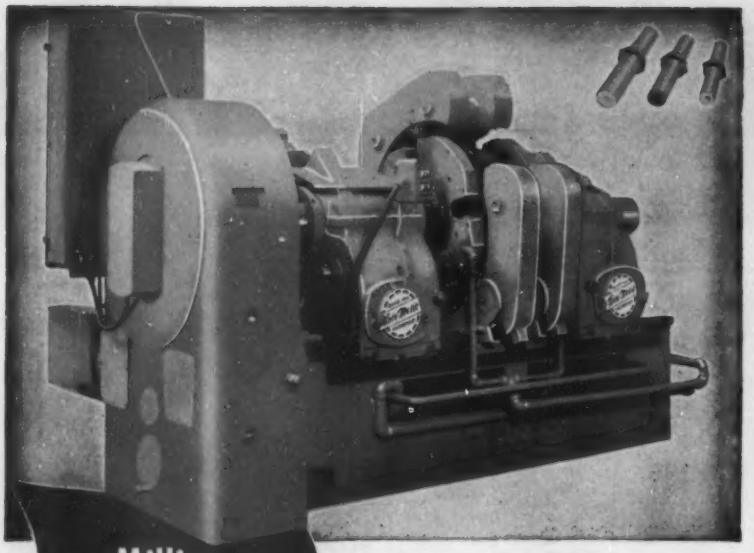

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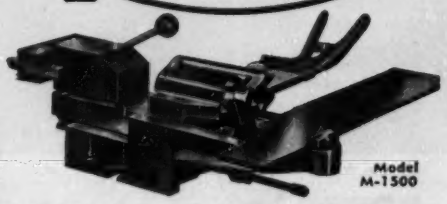

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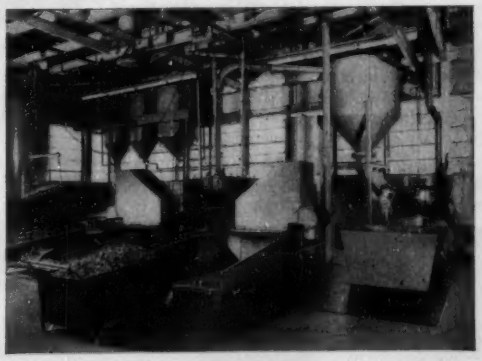

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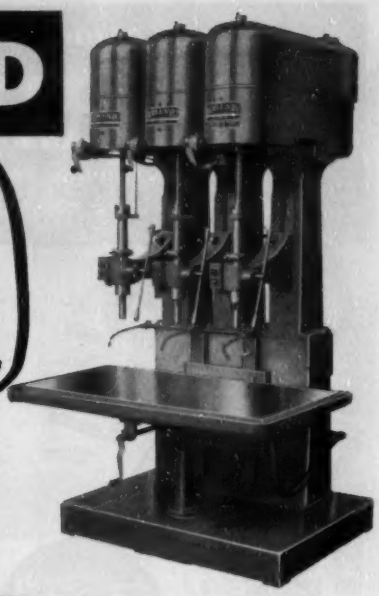

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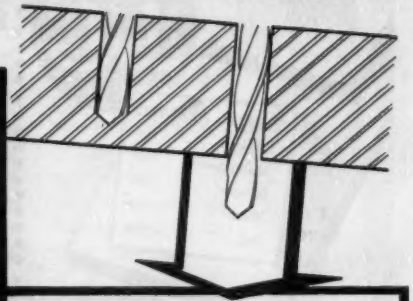

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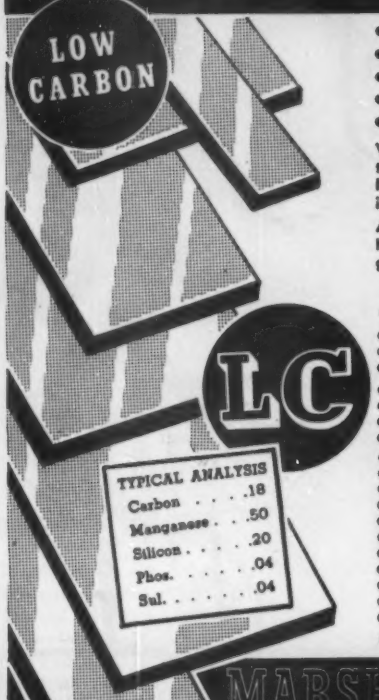

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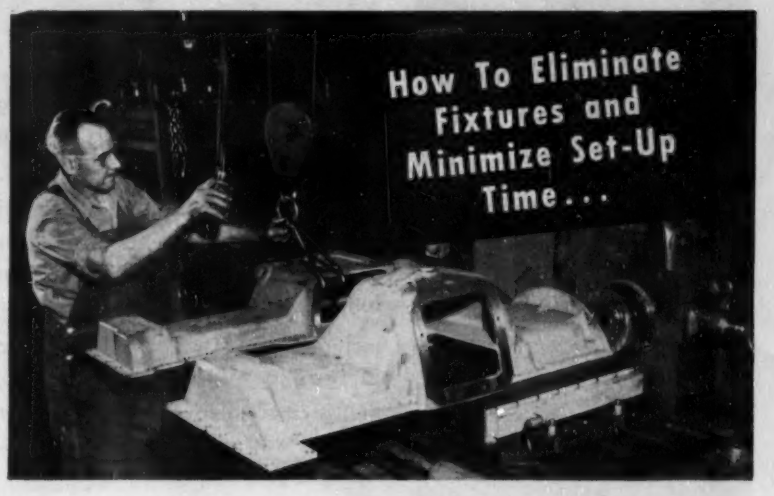

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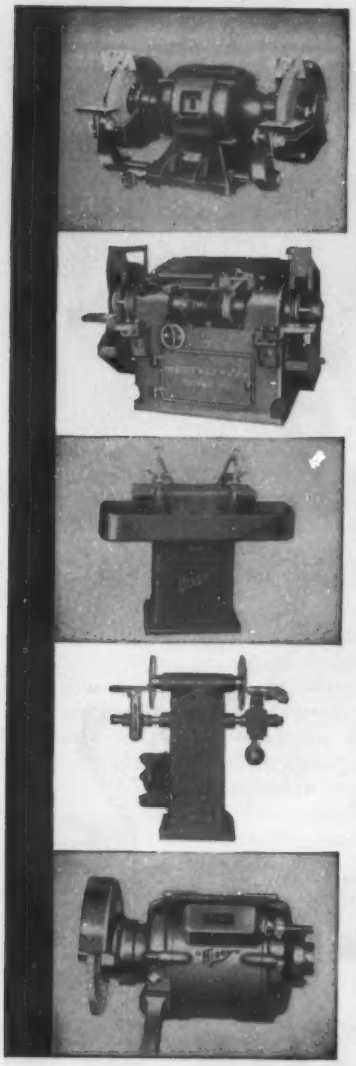

...and the moral of the story is

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SLAVERY was not abolished by Lincoln. He did end physical slavery, but man himself must end mental slavery to habit. Education will help, but the real problem is to breed a race of open-minded, inquiring men who welcome the chance to wonder, to question and to analyze—then to take a chance on a new idea that looks sound.

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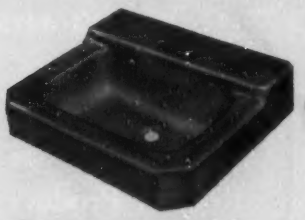

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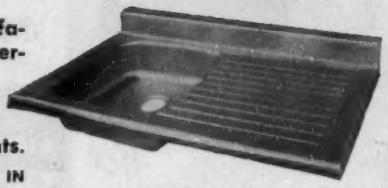

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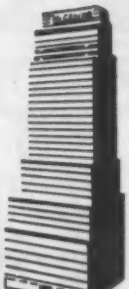

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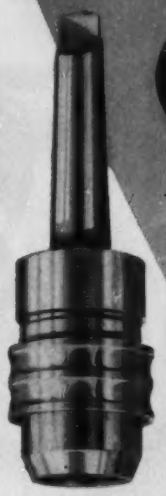

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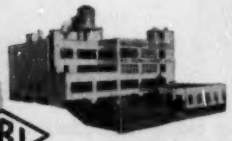

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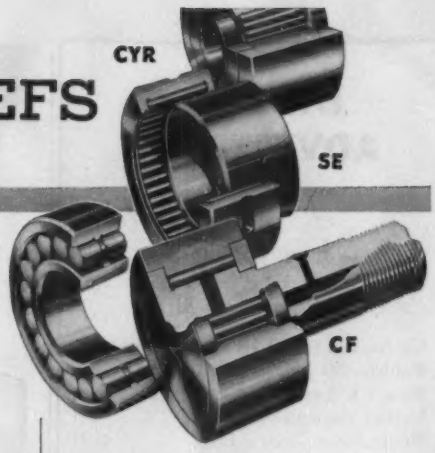

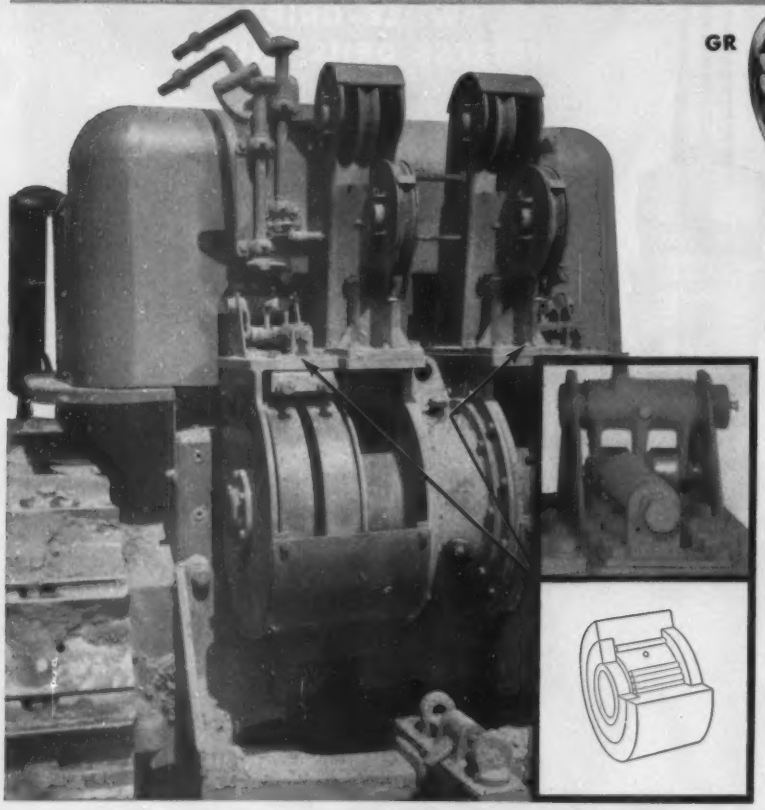

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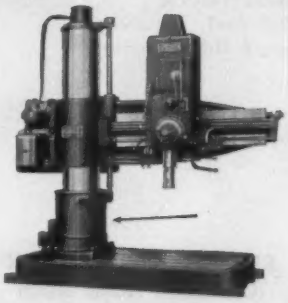
It takes dependable, precision bearings to achieve the "fast, accurate control" featured in Gar Wood Cable Control Units. That's why Gar Wood has standardized on Multirol CYR Bearings as cam rollers on the control arms. The Model 281 unit uses 4 CYR bearings to enable precise, frictionless adjustment of control cables on each of two drums that handle a scraper or dozer blade. CYR Bearings have a thick outer race section to withstand the heavy shock loads encountered in such cam applications. They help make the Gar Wood Cable Control a rugged, hard-working unit that stops and starts smoothly.

Multirol CYR Bearings are built to provide longer life and greater efficiency in cam operations. They are labyrinth sealed by roller retaining end plates tightly fitted and secured to the shoulders of the inner ring. Yoke mounting is possible where desirable on shaft sizes ranging from ¼" to 1¼" for corresponding roller diameters of ¾" to 4".

FOSDICK DRILL HEADS POSITIONED BY CYR BEARINGS



Fosdick Machine Tool Company uses Multirol CYR Bearings to provide rigid and accurate support between inner and outer columns of this Hydraulic Radial Drill. The CYR Bearings act as guide rollers between columns to provide precision positioning of the drill head.

CYR BEARINGS REDUCE FRICTION ON VALVAIR VALVES

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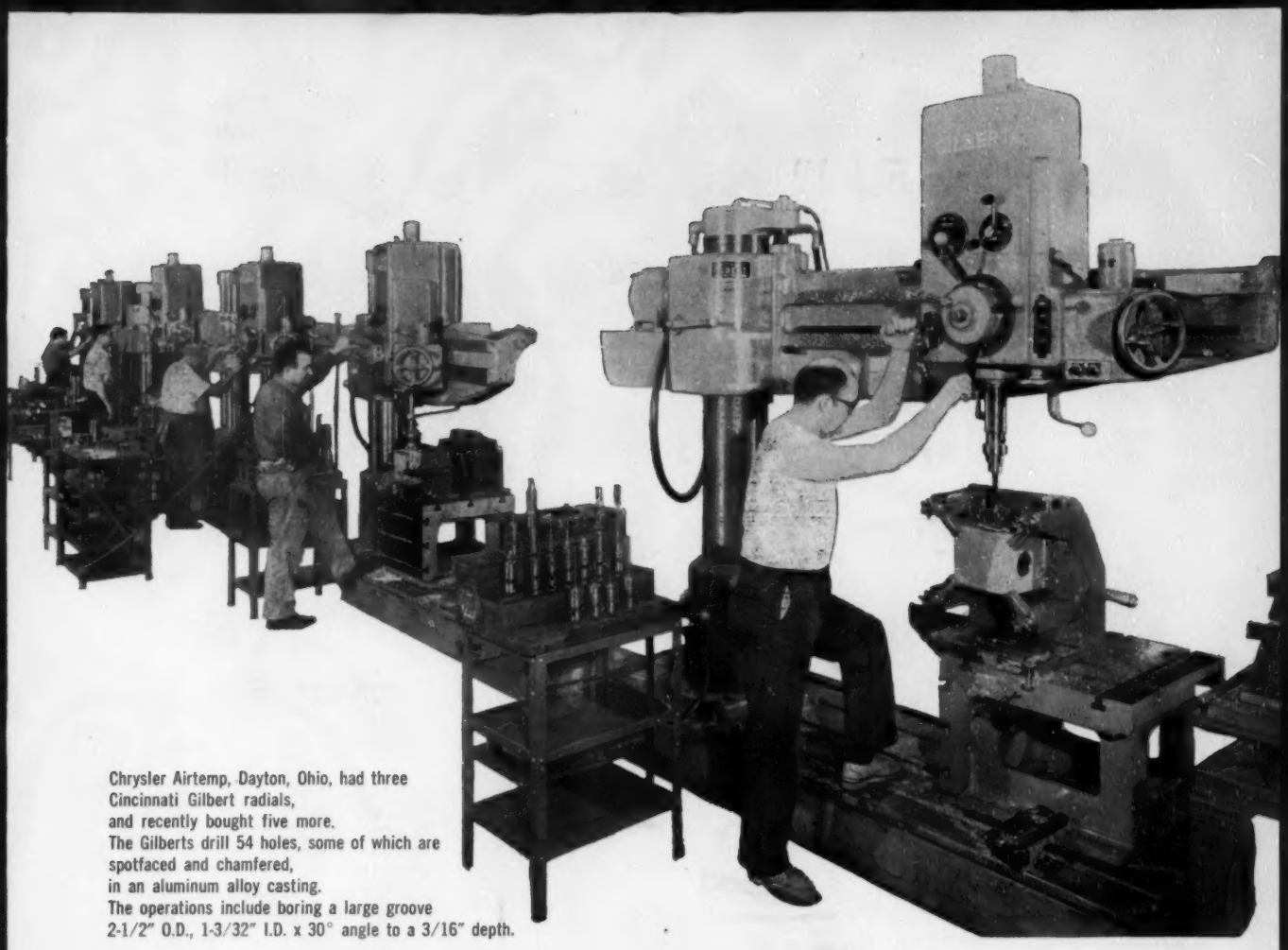

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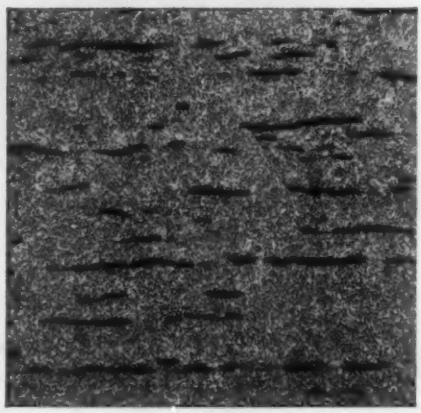

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The greater stability of Graph-Mo steel enables you to make gages that stay accurate longer. After 12 years of service, for example, a typical Graph-Mo steel master plug gage showed less than 10 millionths of an inch change from its original dimensions.

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